WINTER QUARTERS CANYON DATA ADEQUACY

APPENDICES C, D, AND E

WATER RESOURCES
SOILS AND ASSOCIATED RECLAMATION
WILDLIFE AND T&E SPECIES

VOLUME 2

APPENDIX C (Continued)
WATER RESOURCES

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RECEIVED

SEP 04 2002

DIVISION OF
OIL, GAS AND MINING

U.S. FOREST SERVICE
MANTI LA SAL FOREST
DENNIS KELLY DATA FILES

FISH CREEK

Fish Creek
1986

W/S 002
Sub W/S 500

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Meas. No. _____
Comp. by _____
Checked by _____

DISCHARGE MEASUREMENT NOTES

Sta. No. _____
Station Name Fish Creek above Gooseberry Cont.
Date 8/6/86 19__ Party Kelly / Mills
Width _____ Area _____ Vel. _____ G. H. _____ Disch. _____
Method _____ No. secs. _____ G. H. change _____ in _____ hrs. Susp. _____
Method coef. _____ Hor. angle coef. _____ Susp. coef. _____ Meter No. _____

GAGE READINGS				
Time		Recorder	Inside	Outside
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Date rated _____ Used rating for rod _____ susp. Meter _____ ft. above bottom of wt. Tags checked _____
Spin before meas. _____ after _____
Meas. plots _____% diff. from _____ rating
Wading, cable, ice, boat, upstr., downstr., side bridge _____ feet, mile, above, below gage, and _____
Check-bar, chain found _____ changed to _____ at _____
Correct _____
Levels obtained _____

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%); based on following conditions: Cross section _____
Flow _____ Weather _____
Other _____ Air _____°F@ _____
Gage _____ Water _____°F@ _____
_____ Record removed _____ Intake flushed U L _____
Observer _____
Control _____
Remarks Sampling at 1400 hrs.
velocity measured with Gurley Pygmy meter.
G. H. of zero flow _____ ft.

2500-4(12/77)

GPO : 1978 O - 268-758

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY At point	VELOCITY Mean in vertical	Adjusted for hor. angle or ----------	Area FT²	Discharge CFS
*	1.7	H_2O Edge									
	2.0	0.8	.42	.21	14	60	0.233			0.213	0.064
	3.0	1.0	.75	.30	2	60	0.033			0.75	0.025
	4.0	1.0	.60	.24	37	60	0.617			[illegible]	0.374
	5.0	1.0	.56	.22	47	60	0.783			0.560	0.438
	6.0	1.0	.83	.32	65	60	1.083			0.830	0.899
	7.0	1.0	.50	.25	64	60	1.067			0.500	[illegible]
	8.0	1.0	.55	.27	39	60	0.650			0.550	[illegible]
	9.0	1.0	.55	.27	93	60	1.550			0.550	0.853
	10.0	1.0	.54	.27	26	61	0.426			0.540	0.230
	11.0	1.0	.33	.17	29	60	0.483			0.330	0.159
	12.0	1.7	.36	.18	0	60	0			0.396	0
*	13.2	H_2O Edge									
										5.879	3.929

DATA SHEET

WATERSHED: 002 PRICE RIVER

DATE: 10/6/86

SUBWATERSHED: 500 FISH CREEK

AUTHOR: [illegible]

SITE: FISH CREEK 200 YARDS ABOVE THE CONFLUENCE
WITH GOOSEBERRY CREEK
SW 1/4, NW 1/4, SECTION 15, T12S, R6E, SLB&M

Determine QB from Thomas & Lindskov pg 21

A = 21.569 mi²

E = 8.72 Thousand feet (MSL)

*

```
* LIST
00050 let A=21.596
00060 let E=8.72
00100 let Q=10.8*A^.8
00110 print "RT=2   Q=";Q
00200 let Q=25.1*A^.74
00210 print "RT = 5   Q=";Q
00300 let Q=680*A^.706*E^(-1.3)
00310 print "RT = 10   Q=";Q
00400 let Q=10300*A^.672*E^(-2.33)
00410 print "RT = 25   Q =";Q
00500 let Q=64200*A^.651*E^(-3.03)
00510 print "RT = 50   Q =";Q
00600 let Q=347000*A^.631*E^(-3.68)
00610 print "RT = 100   Q =";Q
01120 end
*

** RUN
RT=2   Q= 126.16
RT = 5   Q= 243.843
RT = 10   Q= 356.373
RT = 25   Q = 522.556
RT = 50   Q = 670.576
RT = 100   Q = 834.101

END at 01120
*
```

$Q_{1.5}$ = 90 CFS

DATA SHEET

WATERSHED: 002 PRICE RIVER

DATE:

SUBWATERSHED: 500 FISH CREEK

AUTHOR:

SITE: FISH CREEK 200 YARDS ABOVE THE CONFLUENCE
WITH GOOSEBERRY CREEK
SW 1/4, NW 1/4, SECTION 15, T12S, R6E, SLB&M

Determine Q @ from X-section data collected 8/6/84

$Q = AV$

$A = 19.54446$ ft^2 from R4 CROSS 2.2 Item 4 interpolated

$n = 0.210543$ from R4 CROSS 2.2 Item 1

$V = \frac{1.48}{n} R^{2/3} S^{1/2}$

$S = 0.020$ ft/ft. from field measurements

$R = \frac{A}{WP}$

$WP = 20.8$ ft

*

```
* LIST
00100 let A=19.5445
00110 let N=.210543
00120 let S=.02'
00130 let WP=20.8
00140 let R=A/WP
00150 print "R=";R
00160 let Y=2/3
00170 let V=R^Y*S^.5*1.48/N
00180 print "V=";V;"FT/SEC"
00190 let Q=A*V
00200 print "Q=";Q;"CFS"
00210 end
* RUN
R= .939638
V= .953694 FT/SEC
Q= 18.6394 CFS

END at 00210
*
```

Watershed 02 Price River Subwatershed #500 Fish Creek

CROSS SECTION DATA FOR FISH CREEK

LIST NO.	DIST FROM LEFT	TOTAL AREA
1	0	0
2	.54	6.00001E-02
3	.71	.744001
4	.55	1.661
5	.520001	2.237
6	.420001	2.997
7	.5	3.451
8	.520001	3.992
9	.53	4.59
10	.55	5.251
11	.480001	5.7975
12	.400001	6.1765
13	7.00006E-02	6.3145
14	0	6.318
15	0	6.318
16	0	6.318
17	0	6.318
18	0	6.318
19	0	6.318
20	0	6.318
21	0	6.318
22	0	6.318

MEAN DEPTH = .544653

MANNINGS N = .210540
WETTED PERIMETER = 12.6322

Watershed 02 Price River
Subwatershed #500 Fish Creek
Site: Fish Creek(200 yards) above the confluence with Gooseberry Creek. SW 1/4, NW 1/4, SEC.15, T12S, R6E, SLBM.

Data collected: 8/6/86
"R4CROSS2.2"
ITEM#1
Run date: 8/22/86 Checked:mjw 8/22/86

Watershed 02 Price River Subwatershed #500 Fish Creek

ELEVATION *	AREA (ft.)	MEAN DEPTH (ft.)	TOP WIDTH (ft.)	MAXIMUM DEPTH (ft.)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.1	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.4	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
.6	[illegible]	[illegible]	[illegible]	[illegible]
.7	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	13.[illegible]	.731[illegible]	18.[illegible]	1.7
[illegible]	11.[illegible]	.6[illegible]	17.[illegible]	1.6
1	9.[illegible]	.6[illegible]	15.[illegible]	1.5
1.1	8.[illegible]	.65[illegible]	13.[illegible]	1.4
1.2	7.25928	.604[illegible]	12	1.3
1.3	6.08999	.534[illegible]	11.4	1.2
1.4	4.9[illegible]	.472[illegible]	10.6	1.1
1.5	3.93[illegible]	.37[illegible]	10.4	.999998
1.6	2.91[illegible]	.3[illegible]	10.2	.899998
1.7	1.95246	.214557	9.10003	.799997
1.8	1.07788	.143717	7.50002	.699997
1.9	.5[illegible]	.15[illegible]	5.00001	.599997
2	.258194	.151672	1.7	.499996
2.1	.138596	.230996	.6	.399996
2.2	7.91978E-02	.158396	.5	.299995
2.3	3.63986E-02	.121329	.3	.199995
2.40001	9.99947E-03	9.99947E-02	.1	9.99947E-02

*distance below tape.

Watershed 02 Price River
Subwatershed #500 Fish Creek
Site: Fish Creek (200 yards) above the confluence with Gooseberry Creek.
SW 1/4, NW 1/4, SEC.15, T12S, R6E, SLBM.

Data collected: 8/6/86
"R4CROSS2.2"
ITEM#4
Run date: 8/22/86 Checked:mjw 8/22/86

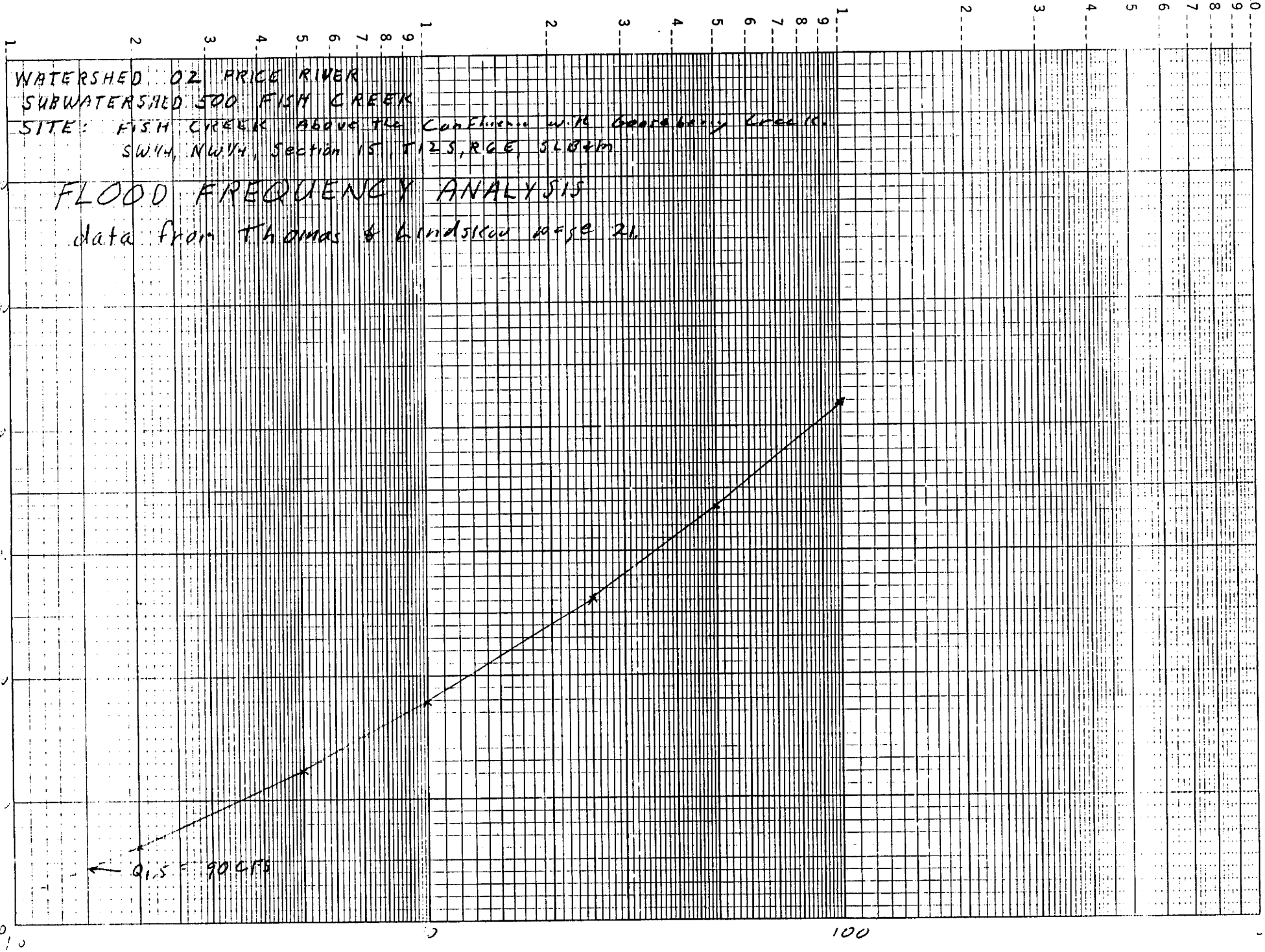
K+E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 5490

WATERSHED 02 PRICE RIVER
SUBWATERSHED 500 FISH CREEK
SITE: FISH CREEK Above the Confluence with Goodsberry Creek.
SW¼, NW¼, Section 15, T12S, R6E, SLB&M

FLOOD FREQUENCY ANALYSIS

data from Thomas & Lindskov page 21



K+E 10 X 10 TO ½ INCH 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

46 1323

Site: Fish Creek (200 yds) Above the Confluence with Cooper Cr.

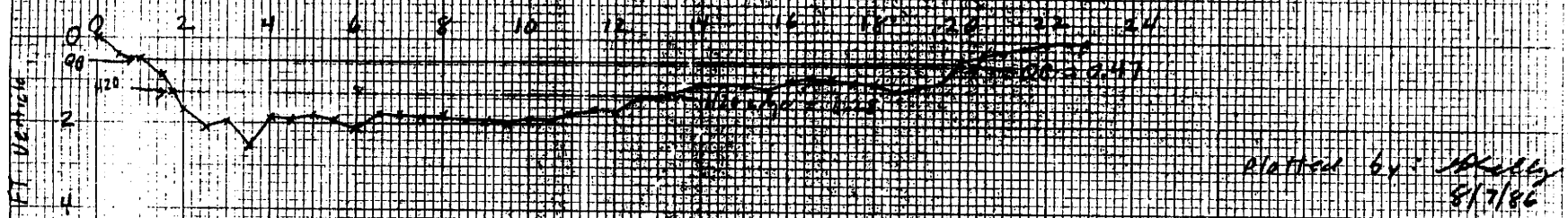
SW ¼ NW ¼ Sec 17 T12S R4E Clark Co.

WATERSHED 02 PRICE RIVER

SUBWATERSHED 500 Fish Creek

Data collected 8/6/86

STREAM CHANNEL CROSS SECTION DATA COLLECTED 8/6/86



Plotted by: [illegible] 8/7/86

Q = 3.929 CFS

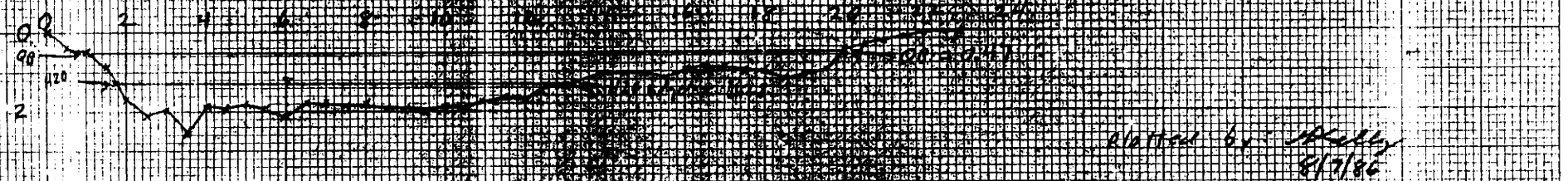
Slope = 2.00 % = 0.020 ft/ft

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A. 46 1323

Site: Fish Creek above the confluence with [illegible] WATERSHED 02 PRICE RIVER
SUBWATERSHED 500 FISH Creek

Data collected 8/6/86

STREAM CHANNEL CROSS SECTION DATA COLLECTED 8/6/86



plotted by: [illegible]
8/7/86

Q = 3.92 cfs

slope = 2.00 % = 0.0200 ft/ft

SAGGED TAPE CROSS SECTION AND DISCHARGE NOTES

Tape Length ____ Wt. ____ #/Ft
Stakes @ = Elev.? /Yes/or/No/

Tape Dist. From Left* Stake	VERTICAL DEPTH To Grd.	VERTICAL DEPTH Of Water	CURRENT VELOCITY Revs.	CURRENT VELOCITY Time	CURRENT VELOCITY Ft/Sec
0	0				
0.5	0.38				
1.0	0.48	QB			
1.5	0.90				
1.7	1.28	H2O Tape			
2.0	1.62	Thalweg			
2.5	2.07				
3.0	1.99				
3.5	2.50				
4.0	1.83				
4.5	1.90				
5.0	1.80				
5.5	1.90				
6.0	2.10				
6.5	1.78				
7.0	1.78				
7.5	1.81				
8.0	1.80				
8.5	1.88				
9.0	1.96				
9.5	2.00				
10.0	1.83				
10.5	1.86				
10.9	1.79	Thalwg			
11.5	1.61				
12.0	1.68				
12.5	1.35				

Notes Continued

Tape Dist. From Left* Stake	VERTICAL DEPTH To Grd.	VERTICAL DEPTH Of Water	CURRENT VELOCITY Revs.	CURRENT VELOCITY Time	CURRENT VELOCITY Ft/Sec
13.0	1.35				
13.2	1.28	H2O Edge			
14.0	1.13				
14.5	1.01				
15.0	1.08				
15.5	1.15				
16.0	0.96				
16.5	0.86				
17.0	0.86				
17.5	0.95				
18.0	1.00				
18.5	1.14				
19.0	1.04				
19.5	0.95				
20.0	0.47	QB			
20.5	0.34				
21.0	0.24				
21.5	0.17				
22.0	0.05				
22.5	0.03				
22.9	0.20	Pin			

Ave. Depth.... ____ Velocity.. ____
Width ____ Ft., Discharge ____ c.f.s.

Observations and Remarks: Fish Creek above Goodberry Confluence (200 yards above) 8-6-86 1400
SW 1/4 NW 1/4 Sec 15 T12S R6E Stgtm Watershed 02-500

Note: Use one star(*) in the left margin to indicate PRESENT WATER LINE, **for NORMAL HIGH WATER or "Grass" LINE & *** for EXTREME HWL.

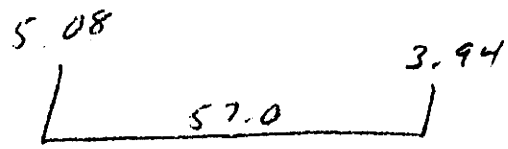
Signature: Kelly / Mills

Page ____ of ____.

Distance = 57.0 ft — measured with a clothtape

Rod Read = 3.94 ft — Stadia Rod

HI = 5.08 ft. — Top of the velocity head rod [illegible] + link to pivot pin above the base of the [illegible]



$$\frac{5.08 - 3.94}{57.0} \times 100 = 2.00\ \%$$

[illegible] = Stadia Rod

[illegible] = Inclinometer 1" on top of a 5' Velocity head Rod [illegible] with a [illegible] tape

FISH CREEK 1987

FISH CREEK DRAINAGE INTO SCOFIELD RESERVOIR

MEASURED FLOWS ON 8/27/87 &10/6/87

Station Name	Station #	8/27/87 Flow	10/6/87 Flow (cfs)	team
Fish Cr st USGS Gage	2	6.8	15.1	KH
French Creek	4	0.8	0.1	MH
Fish Creek Above French Creek	5	4.9	6.6	NP
Fish Cr 1 mi. below confl. w/Gooseberry Cr.	6	10.6	9.5	NP
Gooseberry Cr above Confl. w/Fish Cr.	8	11.7	7.1	MH
Gooseberry Cr. below Confl. w/Silver Cr.	9	11.0	7.6	MH
Silver Cr. Above Confl. w/Gooseberry Cr.	10	2.9	2.4	MH
Gooseberry Cr. above Confl. w/Silver Cr.	11	18.7	6.9	MH
Mill Cr. above Confl. with Gooseberry Cr.	12	2.0	0.1	MH
Goosebery Cr. above Confl. w/Mill Cr.	13	9.2	9.3	MH
Gooseberry Cr at the pipeline	15	12.8	8.7	MH
Gooseberry Cr above Eccles highway SR-264	16A	0.85	0.7	KH
Gooseberry Cr below Gooseberry Reservoir	17	6.9	3.4	KH
Gooseberry Cr. above Gooseberry Reservoir	18	3.4	3.4	KH
Gooseberry Cr. below Eccles highway SR-264	19	1.2	1.8	KH
Fish Cr above confl. w/Gooseberry Cr	20	7.8	3.1	NP
Fish Cr 1 mi. above Confl. w/Gooseberry Cr	21	4.2	1.4	NP
Fish Cr 1 1/2 mi. above conf. w/Gooseberry Cr	22	1.9	1.3	NP
Fish Cr 2 mi. above conf. w/Gooseberry Cr	23	3.9	1.1	NP
Fish Cr 2 1/2 mi. above conf. w/Gooseberry Cr	24	3.2	0.8	NP
Fish Cr above Confl. w/"C" Canyon	25	1.4	1.4	NP
"C" Canyon above Confl. w/Fish Creek	26	0.48	0.4	NP
Fish Cr above Confl. w/Straight Fork	27	1.3	0.5	NP
Straight Fork above Confl. w/Fish Cr.	28	0.27	0.1	NP

FISH CREEK
1944-1984

STATION NUMBER 09310500

FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

FOR WATER YEARS 1944-84

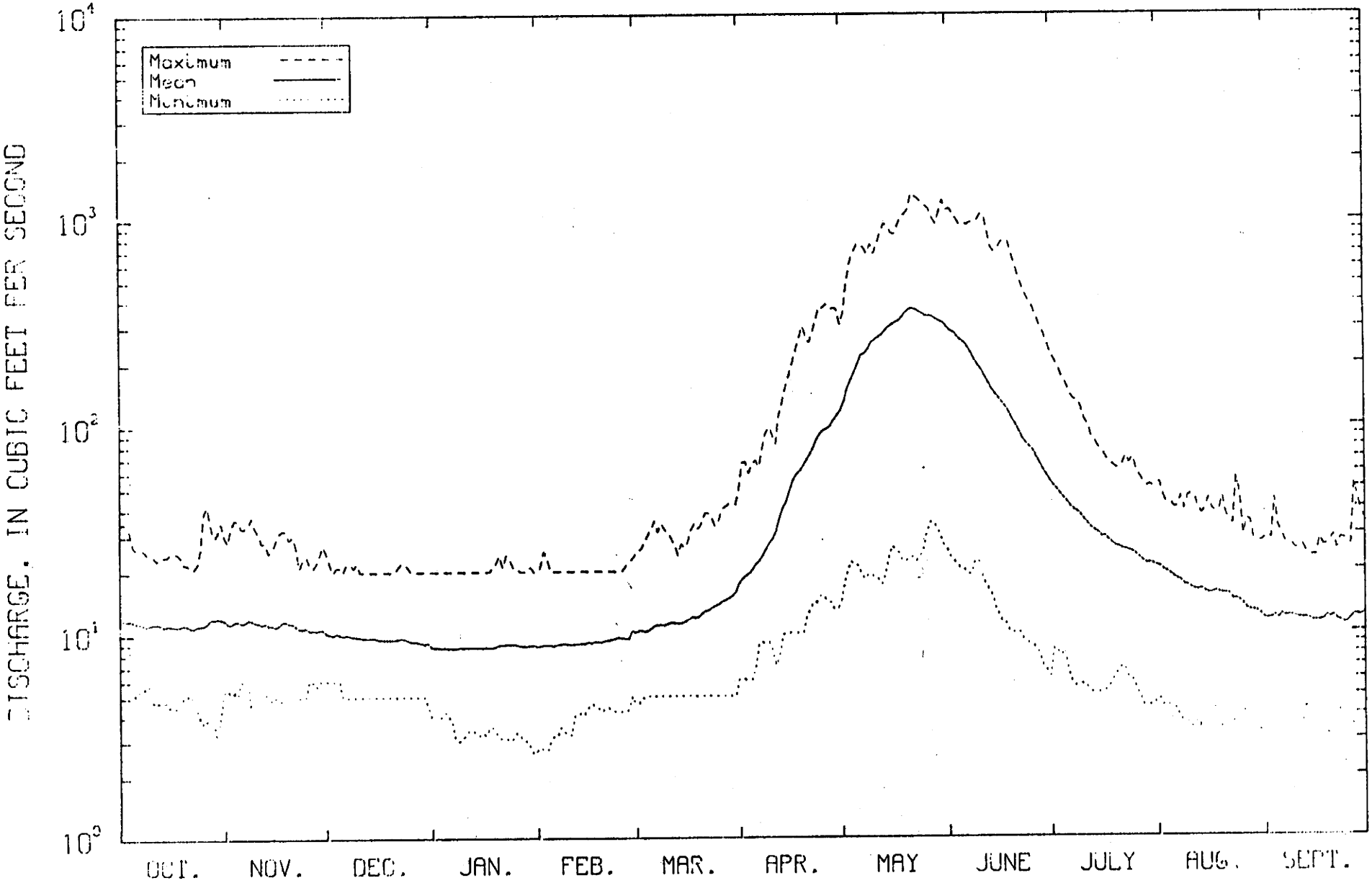


Table 15.—Mineralogic analyses of streambed samples

Site No: See plate 1.
Visual estimates: tr, trace.

Stream	Site No.	Date	Particle-size diameter (mm)	Mineral composition (Percent by weight)														Visual estimates (Percent by volume)		
				Quartz	Potassium feldspar	Plagioclase feldspar	Calcite	Dolomite	Ankerite	Rhodochrosite	Goethite	Chlorite	Kaolinite	Illite	Montmorillonite	Mixed clay layer	Total	Organic	Pyrite	Coal
Gooseberry Creek	1	7-19-79	<0.476	37	2	3	24	5	3	4	0.1	0.4	2	7	0.4	0.1	88	0	0	tr
			<.062	37	4	4	12	4	0	3	2			16			82	—	—	—
			<.002	—	—	—	—	—	—	—	—	4	19	72	4	1	—	—	—	—
Fish Creek	2	7-18-79	<.476	69	2	0	11	0	0	1	0	0	3	0	0	3	89	0	0	0
			<.062	37	2	0	27	<.5	0	6	0			2			76	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	52	0	0	48	—	—	—	—
Pondtown Creek	3	7-18-79	<.476	74	4	.2	2	0	0	0	2	0	4	4	0	.9	91	0	0	0
			<.062	72	8	2	4	<.5	0	0	2			9			97	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	44	46	0	10	—	—	—	—
	4	7-18-79	<.476	71	2	.1	4	0	1	.1	3	0	4	4	0	2	91	tr	0	tr
			<.062	61	7	1	9	<.5	<.5	1	2			8			89	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	43	40	0	17	—	—	—	—
Mud Creek	5	7-17-79	<.476	75	4	.1	4	1	.3	0	2	0	3	3	0	2	94	0	0	.5
			<.062	77	8	1	1	1	1	<.5	0			10			99	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	37	33	0	30	—	—	—	—
	18	7-17-79	<.476	72	6	2	2	1	.1	1	3	0	3	4	0	2	96	0	0	3
			<.062	69	11	2	3	1	1	0	<.5			8			95	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	35	42	0	23	—	—	—	—
Eccles Canyon	20	7-17-79	<.476	60	3	.1	10	.9	.9	.9	3	0	5	2	0	.9	87	tr	0	tr
			<.062	69	7	1	6	<.5	<.5	<.5	0			8			91	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	58	30	0	12	—	—	—	—
	29	7-17-79	<.476	67	3	1	4	1	.9	0	3	0	4	2	0	2	88	0	0	3
			<.062	79	7	1	5	4	<.5	0	0			8			104	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	49	31	0	20	—	—	—	—
Mud Creek	34	7-17-79	<.476	67	2	2	4	1	.1	2	5	0	4	3	0	1	91	0	0	2
			<.062	62	5	1	7	1	1	1	0			9			87	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	46	37	0	17	—	—	—	—
Soldier Creek	42	7-19-79	<.476	30	3	6	24	3	2	4	2	.8	.6	3	.8	3	82	0	0	0
			<.062	40	6	11	8	6	0	1	1			14			87	—	—	—
			<.002	—	—	—	—	—	—	—	—	9	7	39	10	35	—	—	—	—
Pine Canyon	51	7-19-79	<.476	38	2	1	25	4	3	3	2	.5	2	6	.7	2	89	tr	0	0
			<.062	46	4	3	11	6	1	2	1			12			88	—	—	—
			<.002	—	—	—	—	—	—	—	—	5	17	50	6	22	—	—	—	—
Soldier Creek	57	7-19-79	<.476	44	3	5	18	4	2	3	0	.6	1	4	.7	3	88	0	tr	0
			<.062	42	4	6	12	6	<.5	3	0			12			85	—	—	—
			<.002	—	—	—	—	—	—	—	—	7	14	37	8	35	—	—	—	—
	59	7-19-79	<.476	38	6	10	12	6	2	4	.3	.4	1	7	1	4	92	tr	0	0
			<.062	30	5	11	6	5	1	3	1			26			85	—	—	—
			<.002	—	—	—	—	—	—	—	—	3	10	52	7	28	—	—	—	—

SELECTED HYDROLOGIC DATA, PRICE RIVER BASIN, UTAH
WATER YEARS 1979 AND 1980
U.S. Geological Survey
OPEN FILE REPORT 82-916

Water Resources Data
Utah
Water Year 1990

MANTI-LASAL N.F.
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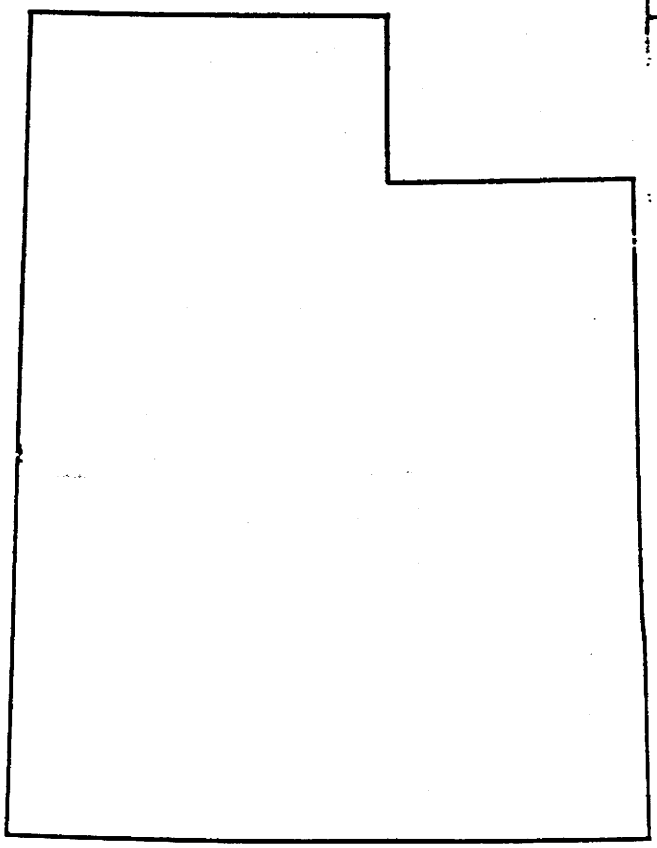

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT UT-90-1
Prepared in cooperation with the State of Utah
and with other agencies

09310500 FISH CREEK ABOVE RESERVOIR, NEAR SCOFIELD, UT

LOCATION.--Lat 39°46'28", long 111°11'25", in NW¼NE¼SW¼ sec. 18, T. 12 S., R. 7 E., Carbon County, Hydrologic Unit 14060007, on right bank 0.8 mi upstream from bridge, 1.2 mi downstream from French Creek, and 4.5 mi north of Scofield.

DRAINAGE AREA.--60.1 mi^2.

PERIOD OF RECORD.--June to October 1931, April to September 1932, October 1938 to current year. Published as Price River above Scofield Reservoir, near Scofield, October 1938 to September 1967.

REVISED RECORDS.--WDR UT-77-1: Drainage area. WDR UT-88-1: 1987.

GAGE.--Water-stage recorder. Elevation of gage is 7,670 ft above NGVD of 1929, from topographic map. June 1931 to September 1932, and October 1938 to July 27, 1967, at various sites about 0.5 mi downstream at different datums.

REMARKS.--Records poor. Small transmountain diversions in headwaters for irrigation in Sevier Lake basin.

AVERAGE DISCHARGE.--52 years (1938-90), 49.5 ft^3/s, 35,860 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,450 ft^3/s May 21, 1984, gage height, 6.20 ft; minimum recorded, 0.6 ft^3/s Oct. 31, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges greater than base discharge of 270 ft^3/s and maximum (*):

Date	Time	Discharge (ft^3/s)	Gage height (ft)	Date	Time	Discharge (ft^3/s)	Gage height (ft)
May 8	0200	*226	*2.48				

Minimum daily, 5.0 ft^3/s, Mar. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	e8.6	e6.7	e7.4	e8.2	e5.6	e5.2	e14	115	75	29	9.1	6.5
2	e7.7	e6.6	e7.4	e8.2	e5.6	e5.2	e15	122	73	30	9.6	6.7
3	e7.0	e6.7	e7.4	e8.0	e5.6	e5.2	e16	128	67	30	9.6	7.2
4	e6.5	e6.8	e7.4	e8.0	e5.6	e5.0	e19	137	62	29	10	7.7
5	e6.5	e7.2	e7.6	e8.0	e5.6	e5.4	e23	155	58	27	9.3	10
6	e6.6	e7.4	e7.6	e8.0	e5.6	e5.4	e29	184	55	26	9.1	9.3
7	e6.6	e7.3	e7.6	e8.0	e5.8	e5.2	e26	209	53	23	9.0	11
8	e6.6	e7.2	e7.4	e9.2	e5.8	e5.3	e29	214	51	25	8.6	11
9	e6.6	e7.2	e7.4	e9.1	e5.8	e5.2	e25	186	49	26	8.5	10
10	e6.8	e7.8	e7.4	e9.0	e5.8	e5.2	e27	184	49	25	9.3	9.0
11	e6.6	e8.0	e7.2	e9.4	e6.0	e5.4	e25	180	69	24	9.3	8.3
12	e6.6	e8.4	e7.2	e8.0	e6.0	e5.4	e27	176	80	23	8.8	7.3
13	e6.6	e38	e7.2	e7.0	e6.0	e5.4	e40	171	69	e19	8.8	6.8
14	e6.6	e70	e7.6	e7.2	e5.4	e5.4	e58	168	58	e19	8.8	6.4
15	e7.3	e36	e7.6	e6.2	e5.4	e5.4	e80	166	52	e19	9.7	5.9
16	e7.2	e17	e7.6	e6.2	e5.4	e5.4	e100	155	52	e18	13	6.5
17	e6.9	e10	e7.9	e6.2	e5.4	e5.4	e110	143	49	e17	17	6.8
18	e6.8	e8.5	e7.6	e6.2	e5.4	e5.2	e110	140	47	e17	12	6.6
19	e6.7	e8.2	e7.4	e6.2	e5.5	e5.4	122	136	44	e17	11	7.7
20	e6.7	e8.1	e7.5	e5.6	e5.6	e5.6	127	131	43	e18	9.8	7.7
21	e7.0	e7.9	e7.8	e5.6	e5.4	e5.8	150	124	41	e18	9.8	6.8
22	e8.0	e7.7	e7.8	e5.6	e5.4	e6.0	156	120	40	e16	8.3	6.8
23	e7.6	e7.7	e7.8	e5.6	e5.6	e6.2	163	117	34	e14	7.7	7.0
24	e7.1	e7.7	e8.4	e5.6	e5.6	e6.8	164	113	31	e15	7.7	7.6
25	e7.0	e7.9	e8.2	e5.4	e5.6	e7.6	149	107	29	e16	7.7	7.4
26	e7.4	e7.9	e8.2	e5.6	e5.6	e8.2	146	102	25	e13	7.0	7.7
27	e7.1	e7.8	e8.2	e5.7	e5.4	e8.5	130	97	23	12	6.6	7.3
28	e7.1	e7.4	e8.2	e5.5	e5.6	e8.5	129	90	26	11	6.1	7.2
29	e7.1	e7.4	e8.2	e5.6	---	e8.5	133	88	27	11	6.3	7.2
30	e6.8	e7.4	e8.2	e5.6	---	e9.0	119	85	29	9.4	6.2	6.7
31	e6.8	---	e8.2	e5.6	---	e12	---	80	---	9.3	6.1	---
TOTAL	216.5	359.9	238.6	213.3	157.1	193.4	2461	4323	1460	605.7	279.8	230.1
MEAN	6.98	12.0	7.70	6.88	5.61	6.24	82.0	139	48.7	19.5	9.03	7.67
MAX	8.6	70	8.4	9.4	6.0	12	164	214	80	30	17	11
MIN	6.5	6.6	7.2	5.4	5.4	5.0	14	80	23	9.3	6.1	5.9
AC-FT	429	714	473	423	312	384	4880	8570	2900	1200	555	456

CAL YR 1989 TOTAL 9374.5 MEAN 25.7 MAX 214 MIN 5.2 AC-FT 18590
WTR YR 1990 TOTAL 10738.4 MEAN 29.4 MAX 214 MIN 5.0 AC-FT 21300

e Estimated

MISCELLANEOUS TEMPERATURE MEASUREMENTS AND FIELD DETERMINATIONS

WATER-QUALITY DATA, WATER YEAR OCTOBER 1989 TO SEPTEMBER 1990

GREEN RIVER BASIN--Continued

09295000 DUCHESNE RIVER AT MYTON, UT (Lat 40°12'01", long 110°03'47")

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
02...	1255	36	15.0	1480
NOV				
27...	1250	42	2.0	620
FEB . 1990				
05...	1700	76	.0	--
MAR				
08...	0840	78	.5	1960
APR				
09...	1350	31	13.0	1660
MAY				
09...	1825	53	16.5	1510
MAY . 1990				
30...	1715	78	15.0	1460
JUN				
12...	1425	1350	14.0	385
JUL				
10...	1910	86	27.0	1270
AUG				
30...	0755	22	19.0	1500
SEP				
27...	1655	18	20.0	1700

09299500 WHITEROCKS RIVER NEAR WHITEROCKS, UT (Lat 40°35'13", long 109°55'37")

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
04...	0855	44	5.0	<50
NOV				
07...	0800	33	.0	<50
DEC				
06...	1600	26	.0	<50
FEB . 1990				
08...	1645	20	.0	--
MAR				
08...	1145	22	--	--
APR				
09...	1520	29	8.5	58
MAY . 1990				
08...	1540	183	9.0	<50
31...	1525	218	10.0	<50
JUN				
08...	0830	424	6.5	<50
12...	1125	656	7.5	<50
JUL				
13...	1110	113	13.5	<50
AUG				
30...	1040	80	11.5	<50
SEP				
28...	1015	71	9.5	<50

09309600 FAIRVIEW TUNNEL NEAR FAIRVIEW, UT (Lat 39°40'03", long 111°18'41")

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
03...	1235	.29	9.0	300
APR . 1990				
18...	0920	1.7	.0	230
MAY				
02...	1325	6.4	8.0	310
JUN . 1990				
05...	1445	4.0	18.0	365
JUL				
26...	1025	9.7	15.0	260
AUG				
29...	1155	9.1	16.5	180

09310000 GOOSEBERRY CREEK NEAR SCOFIELD, UT (Lat 39°42'57", long 111°17'58")

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
03...	1030	2.7	10.0	300
NOV				
14...	1400	74	4.0	150
FEB . 1990				
20...	1425	3.1	.5	440
MAY				
08...	0850	85	6.5	290
JUN . 1990				
06...	1405	21	16.0	310
JUL				
26...	0930	6.3	15.5	370
AUG				
01...	1320	--	17.0	--
29...	1040	2.7	15.0	200

09310500 FISH CREEK ABOVE RESERVOIR, NEAR SCOFIELD, UT (Lat 39°46'28", long 111°11'25")

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
03...	1605	6.7	11.0	300
NOV				
14...	1640	74	2.0	220
JAN . 1990				
10...	1325	10	.0	420
FEB				
20...	1035	5.6	.0	450
APR				
18...	1140	110	3.0	115
MAY				
02...	1605	119	7.0	285
MAY . 1990				
03...	1100	129	7.5	290
10...	1210	184	7.5	320
JUN				
06...	1210	56	14.0	310
JUL				
26...	1300	13	18.0	280
AUG				
01...	1500	--	19.0	--
29...	1435	6.5	17.0	265

09312600 WHITE RIVER BELOW TABBYUNE CREEK, NEAR SOLDIER SUMMIT, UT (Lat 39°52'33", long 111°02'12')

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	TEMPER-ATURE (DEG C)	SPE-CIFIC CON-DUCT-ANCE (US/CM)
OCT . 1989				
04...	1115	2.6	8.5	430
NOV				
15...	1335	1.3	4.0	580
JAN . 1990				
10...	1445	2.7	.0	600
FEB				
14...	1630	2.1	.0	600
MAR				
20...	1145	5.5	1.5	485
MAY . 1990				
03...	1350	53	7.0	460
JUN				
06...	0945	16	13.0	530
JUL				
25...	--	6.6	--	460
AUG				
02...	1105	--	18.0	--
30...	1025	1.1	17.5	530

Fish Creek
1939-1977
1939-1984

STATION NUMBER 09310500

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING SEPTEMBER 30
DISCHARGE, IN CUBIC FEET PER SECOND
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1		3		7		15		30		60		90		120		183	
1939	242.0	33	238.0	34	230.0	34	202.0	34	166.0	34	119.0	35	91.0	35	72.0	35	50.0	35
1940	480.0	21	473.0	20	458.0	19	395.0	18	288.0	20	191.0	22	136.0	23	106.0	23	72.0	24
1941	598.0	13	565.0	14	526.0	13	477.0	8	386.0	9	259.0	10	186.0	9	145.0	11	100.0	10
1942	593.0	14	566.0	13	522.0	14	412.0	16	326.0	16	239.0	13	185.0	11	148.0	9	102.0	9
1943	241.0	34	240.0	33	236.0	33	220.0	33	177.0	33	154.0	27	121.0	27	98.0	26	69.0	26
1944	522.0	19	499.0	18	460.0	18	434.0	15	392.0	7	261.0	9	186.0	10	145.0	10	99.0	11
1945	554.0	17	537.0	15	480.0	17	411.0	17	319.0	18	234.0	14	170.0	14	135.0	14	93.0	14
1946	384.0	28	371.0	27	353.0	27	313.0	26	248.0	26	166.0	26	122.0	26	96.0	27	67.0	27
1947	540.0	18	535.0	17	496.0	16	392.0	19	291.0	19	196.0	19	147.0	19	117.0	19	83.0	19
1948	382.0	29	369.0	30	340.0	28	271.0	30	207.0	30	136.0	32	101.0	32	80.0	32	55.0	33
1949	496.0	20	462.0	21	417.0	20	376.0	20	327.0	15	244.0	12	181.0	12	142.0	12	98.0	12
1950	432.0	23	428.0	22	405.0	21	364.0	21	273.0	23	190.0	23	144.0	20	114.0	20	79.0	20
1951	399.0	26	375.0	26	368.0	25	332.0	23	275.0	22	194.0	20	150.0	18	120.0	18	84.0	18
1952	940.0	2	902.0	2	799.0	3	728.0	2	721.0	1	536.0	1	390.0	1	303.0	1	205.0	1
1953	448.0	22	404.0	24	369.0	24	325.0	25	265.0	24	175.0	25	132.0	24	106.0	24	75.0	23
1954	198.0	36	198.0	36	188.0	36	163.0	36	150.0	36	107.0	36	80.0	36	64.0	36	45.0	36
1955	371.0	30	370.0	28	328.0	30	280.0	28	229.0	28	153.0	28	113.0	28	90.0	28	63.0	28
1956	392.0	27	382.0	25	356.0	26	289.0	27	251.0	25	178.0	24	131.0	25	103.0	25	71.0	25
1957	736.0	6	731.0	5	692.0	5	568.0	6	401.0	6	288.0	6	211.0	6	167.0	6	115.0	6
1958	776.0	4	759.0	4	726.0	4	610.0	4	452.0	5	284.0	7	205.0	7	159.0	7	108.0	8
1959	197.0	37	193.0	37	173.0	37	142.0	37	113.0	37	81.0	37	60.0	38	48.0	38	34.0	38
1960	406.0	25	370.0	29	334.0	29	271.0	31	199.0	31	129.0	33	99.0	33	79.0	33	56.0	32
1961	109.0	39	102.0	39	89.0	39	80.0	39	69.0	38	50.0	39	38.0	39	30.0	39	22.0	39
1962	660.0	9	640.0	8	600.0	8	477.0	9	385.0	10	299.0	5	223.0	5	175.0	3	119.0	4
1963	341.0	31	337.0	31	323.0	31	277.0	29	221.0	29	141.0	30	103.0	31	82.0	31	58.0	31
1964	602.0	12	598.0	12	556.0	10	452.0	14	320.0	17	194.0	21	139.0	22	109.0	22	76.0	22
1965	655.0	10	617.0	10	539.0	12	454.0	13	386.0	8	263.0	8	195.0	8	155.0	8	109.0	7
1966	284.0	32	267.0	32	256.0	32	230.0	32	185.0	32	137.0	31	105.0	29	84.0	29	60.0	29
1967	669.0	7	637.0	9	604.0	7	506.0	7	368.0	11	232.0	15	166.0	15	131.0	15	91.0	15
1968	623.0	11	601.0	11	555.0	11	461.0	11	363.0	12	246.0	11	177.0	13	138.0	13	97.0	13
1969	660.0	8	645.0	7	632.0	6	574.0	5	460.0	4	304.0	4	224.0	4	177.0	2	122.0	2
1970	564.0	16	536.0	16	511.0	15	460.0	12	334.0	13	223.0	16	161.0	16	127.0	16	88.0	17
1971	567.0	15	498.0	19	404.0	22	331.0	24	283.0	21	205.0	17	158.0	17	126.0	17	90.0	16
1972	219.0	35	215.0	35	205.0	35	193.0	35	163.0	35	119.0	34	92.0	34	76.0	34	54.0	34
1973	1050.0	1	1010.0	1	907.0	1	739.0	1	518.0	2	319.0	2	226.0	2	174.0	4	119.0	3
1974	749.0	5	679.0	6	595.0	9	472.0	10	329.0	14	201.0	18	143.0	21	112.0	21	77.0	21
1975	907.0	3	870.0	3	820.0	2	663.0	3	491.0	3	317.0	3	224.0	3	173.0	5	118.0	5
1976	430.0	24	413.0	23	394.0	23	333.0	22	235.0	27	142.0	29	103.0	30	82.0	30	59.0	30
1977	137.0	38	132.0	38	111.0	38	83.0	38	67.0	39	60.0	38	61.0	37	55.0	37	44.0	37

STATION NUMBER 09310500

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

DISCHARGE, IN CUBIC FEET PER SECOND
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1	3	7	14	30	60	90	120	183
1940	5.00 10	5.00 9	5.00 7	5.60 10	7.00 16	7.50 16	7.80 17	8.40 19	8.20 11
1941	5.00 11	5.00 10	5.30 11	5.60 11	6.00 11	6.50 10	6.70 9	6.80 6	7.10 5
1942	10.00 37	10.00 36	10.00 36	10.00 36	10.00 35	11.00 35	11.00 35	12.00 35	14.00 36
1943	6.00 17	6.30 17	7.00 21	7.00 18	7.40 21	8.00 22	8.10 21	8.70 25	9.00 18
1944	7.00 23	7.70 28	7.90 28	7.90 26	8.00 26	8.00 23	8.30 24	8.60 23	9.30 19
1945	7.00 24	7.00 23	7.00 22	7.00 19	7.00 17	7.00 12	7.30 10	7.70 11	8.60 15
1946	8.00 31	8.00 30	8.00 29	8.00 27	8.00 27	8.20 27	8.40 25	8.70 24	10.00 28
1947	5.40 14	5.50 14	5.60 12	5.80 12	6.30 12	7.80 19	8.10 22	8.30 17	8.40 14
1948	6.50 20	6.50 19	6.50 17	6.50 16	6.80 13	7.10 13	7.50 12	7.90 14	8.80 17
1949	5.10 12	5.10 11	5.20 8	5.30 8	5.80 8	6.80 11	7.60 15	8.10 15	8.20 12
1950	8.00 32	8.00 31	8.00 30	8.00 28	8.00 28	8.00 24	8.30 23	8.50 20	9.60 24
1951	4.00 4	4.00 4	4.20 3	5.00 6	5.60 6	5.80 5	6.20 6	6.70 5	8.10 10
1952	7.60 28	7.60 27	7.70 27	8.00 29	8.00 29	8.00 25	8.00 18	8.30 18	9.40 22
1953	11.00 38	11.00 38	11.00 38	11.00 38	11.00 36	12.00 36	13.00 36	14.00 38	14.00 37
1954	8.00 33	8.70 33	9.00 33	9.00 33	9.00 32	9.30 32	9.50 30	9.70 29	10.00 25
1955	5.30 13	5.50 12	5.80 13	6.10 15	7.10 18	8.00 26	8.10 19	8.50 21	8.40 13
1956	6.30 18	6.50 20	6.80 19	7.30 22	7.40 22	7.50 17	7.70 16	7.80 12	8.00 8
1957	6.00 15	6.00 15	6.00 14	6.00 13	6.00 9	6.20 8	6.60 7	7.00 7	7.20 6
1958	6.00 16	6.00 16	6.00 15	6.00 14	6.00 10	6.20 9	6.50 8	7.00 8	9.30 20
1959	7.00 25	7.00 24	7.00 20	7.00 20	7.20 19	7.30 14	7.50 13	7.60 10	8.00 9
1960	4.40 6	4.60 5	5.20 9	5.30 7	5.70 7	6.00 6	6.10 4	6.50 4	6.70 4
1961	3.10 1	3.30 1	3.60 1	4.30 2	4.90 2	5.50 4	6.20 5	7.20 9	7.40 7
1962	3.20 2	3.40 2	3.70 2	4.20 1	4.70 1	5.10 3	5.50 3	5.80 3	6.00 1
1963	4.00 5	4.00 3	4.30 4	4.60 3	5.10 5	6.20 7	7.40 11	7.80 13	8.70 16
1964	5.00 7	5.00 6	5.00 5	5.00 4	5.00 3	5.00 1	5.00 1	5.30 1	6.20 2
1965	5.00 8	5.00 7	5.00 6	5.00 5	5.00 4	5.10 2	5.20 2	5.40 2	6.60 3
1966	7.00 26	7.00 25	7.50 26	7.80 25	7.90 25	7.90 20	8.50 26	10.00 30	12.00 33
1967	5.00 9	5.00 8	5.20 10	5.60 9	7.00 14	9.00 29	9.10 28	9.30 27	9.40 23
1968	7.90 30	8.20 32	8.60 32	8.70 31	8.80 30	9.10 30	9.40 29	9.70 28	10.00 26
1969	7.40 27	7.40 26	7.40 25	7.40 23	7.40 20	7.40 15	7.60 14	8.20 16	10.00 27
1970	8.60 35	10.00 37	10.00 37	10.00 37	10.00 33	10.00 33	10.00 34	10.00 31	12.00 34
1971	6.60 21	6.90 21	7.20 23	9.00 32	12.00 37	13.00 37	13.00 37	13.00 36	15.00 38
1972	7.80 29	7.90 29	8.10 31	8.50 30	9.00 31	9.20 31	9.90 32	11.00 33	11.00 29
1973	3.60 3	5.50 13	6.10 16	7.20 21	7.80 24	8.70 28	9.70 31	11.00 34	11.00 30
1974	8.40 34	8.80 34	9.20 34	9.50 34	10.00 34	10.00 34	10.00 33	10.00 32	11.00 31
1975	6.30 19	6.40 18	6.60 18	6.80 17	7.00 15	7.60 18	8.60 27	9.20 26	9.30 21
1976	10.00 36	10.00 35	10.00 35	10.00 35	12.00 38	14.00 38	14.00 38	14.00 37	14.00 35
1977	7.00 22	7.00 22	7.20 24	7.40 24	7.60 23	8.00 21	8.10 20	8.60 22	12.00 32

STATION NUMBER 09310500

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

DISCHARGE, IN CUBIC FEET PER SECOND
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1	3	7	14	30	60	90	120	183
1940	5.00 10	5.00 9	5.00 7	5.60 10	7.00 16	7.50 16	7.80 17	8.40 19	8.20 11
1941	5.00 11	5.00 10	5.30 11	5.60 11	6.00 11	6.50 10	6.70 9	6.80 6	7.10 5
1942	10.00 37	10.00 36	10.00 36	10.00 36	10.00 35	11.00 35	11.00 35	12.00 35	14.00 36
1943	6.00 17	6.30 17	7.00 21	7.00 18	7.40 21	8.00 22	8.10 21	8.70 25	9.00 18
1944	7.00 23	7.70 28	7.90 28	7.90 26	8.00 26	8.00 23	8.30 24	8.60 23	9.30 19
1945	7.00 24	7.00 23	7.00 22	7.00 19	7.00 17	7.00 12	7.30 10	7.70 11	8.60 15
1946	8.00 31	8.00 30	8.00 29	8.00 27	8.00 27	8.20 27	8.40 25	8.70 24	10.00 28
1947	5.40 14	5.50 14	5.60 12	5.80 12	6.30 12	7.80 19	8.10 22	8.30 17	8.40 14
1948	6.50 20	6.50 19	6.50 17	6.50 16	6.80 13	7.10 13	7.50 12	7.90 14	8.80 17
1949	5.10 12	5.10 11	5.20 8	5.30 8	5.80 8	6.80 11	7.60 15	8.10 15	8.20 12
1950	8.00 32	8.00 31	8.00 30	8.00 28	8.00 28	8.00 24	8.30 23	8.50 20	9.60 24
1951	4.00 4	4.00 4	4.20 3	5.00 6	5.60 6	5.80 5	6.20 6	6.70 5	8.10 10
1952	7.60 28	7.60 27	7.70 27	8.00 29	8.00 29	8.00 25	8.00 18	8.30 18	9.40 22
1953	11.00 38	11.00 38	11.00 38	11.00 38	11.00 36	12.00 36	13.00 36	14.00 38	14.00 37
1954	8.00 33	8.70 33	9.00 33	9.00 33	9.00 32	9.30 32	9.50 30	9.70 29	10.00 25
1955	5.30 13	5.50 12	5.80 13	6.10 15	7.10 18	8.00 26	8.10 19	8.50 21	8.40 13
1956	6.30 18	6.50 20	6.80 19	7.30 22	7.40 22	7.50 17	7.70 16	7.80 12	8.00 8
1957	6.00 15	6.00 15	6.00 14	6.00 13	6.00 9	6.20 8	6.40 7	7.00 7	7.20 6
1958	6.00 16	6.00 16	6.00 15	6.00 14	6.00 10	6.20 9	6.50 8	7.00 8	9.30 20
1959	7.00 25	7.00 24	7.00 20	7.00 10	7.20 19	7.30 14	7.50 13	7.60 10	8.00 9
1960	4.40 6	4.60 5	5.20 9	5.30 7	5.70 7	6.00 6	6.10 4	6.50 4	6.70 4
1961	3.10 1	3.30 1	3.60 1	4.30 2	4.90 2	5.50 4	6.20 5	7.20 9	7.40 7
1962	3.20 2	3.40 2	3.70 2	4.20 1	4.70 1	5.10 3	5.50 3	5.80 3	6.00 1
1963	4.00 5	4.00 3	4.30 4	4.60 3	5.10 5	6.20 7	7.40 11	7.80 13	8.70 16
1964	5.00 7	5.00 6	5.00 5	5.00 4	5.00 3	5.00 1	5.00 1	5.30 1	6.20 2
1965	5.00 8	5.00 7	5.00 6	5.00 5	5.00 4	5.10 2	5.20 2	5.40 2	6.60 3
1966	7.00 26	7.00 25	7.50 26	7.80 25	7.90 25	7.90 20	8.50 26	10.00 30	12.00 33
1967	5.00 9	5.00 8	5.20 10	5.60 9	7.00 14	9.00 29	9.10 28	9.30 27	9.40 23
1968	7.90 30	8.20 32	8.60 32	8.70 31	8.80 30	9.10 30	9.40 29	9.70 28	10.00 26
1969	7.40 27	7.40 26	7.40 25	7.40 23	7.40 20	7.40 15	7.60 14	8.20 16	10.00 27
1970	8.60 35	10.00 37	10.00 37	10.00 37	10.00 33	10.00 33	10.00 34	10.00 31	12.00 34
1971	6.60 21	6.90 21	7.20 23	9.00 32	12.00 37	13.00 37	13.00 37	13.00 36	15.00 38
1972	7.80 29	7.90 29	8.10 31	8.50 30	9.00 31	9.20 31	9.90 32	11.00 33	11.00 29
1973	3.60 3	5.50 13	6.10 16	7.20 31	7.80 24	8.70 28	9.70 31	11.00 34	11.00 30
1974	8.40 34	8.80 34	9.20 34	9.50 34	10.00 34	10.00 34	10.00 33	10.00 32	11.00 31
1975	6.30 19	6.40 18	6.60 18	6.80 17	7.00 15	7.60 18	8.60 27	9.20 26	9.30 21
1976	10.00 36	10.00 35	10.00 35	10.00 35	12.00 38	14.00 38	14.00 38	14.00 37	14.00 35
1977	7.00 22	7.00 22	7.20 24	7.40 24	7.60 23	8.00 21	8.10 20	8.60 22	12.00 32

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY

STATION NUMBER 09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH
LATITUDE 394628 LONGITUDE 1111125 STATE 49 COUNTY 007

MINIMUM DISCHARGE, IN CUBIC FEET PER SECOND
FOR WATER YEARS 1931, 1939-84

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.40	5.30	6.00	4.00	2.70	4.60	6.00	14.0	25.0	6.10	4.00	3.40
2	4.80	5.50	6.00	3.80	2.80	4.60	6.00	17.0	23.0	8.30	4.00	3.40
3	4.50	5.20	6.00	3.90	2.70	4.90	6.00	20.0	22.0	8.10	4.00	3.40
4	4.20	5.30	6.00	4.00	2.70	4.90	6.00	22.0	21.0	7.60	4.00	3.60
5	4.50	5.10	6.00	4.20	3.00	5.00	6.00	21.0	20.0	8.00	4.00	3.60
6	5.40	6.00	5.00	4.00	3.20	5.00	7.00	21.0	20.0	6.80	4.00	3.40
7	5.40	6.00	5.00	3.80	3.20	5.00	9.00	19.0	19.0	5.90	4.00	3.30
8	5.40	5.90	5.00	3.10	3.50	5.00	9.00	18.0	19.0	5.50	3.70	3.20
9	5.70	4.60	5.00	3.00	3.30	5.00	9.00	19.0	22.0	5.50	3.60	3.20
10	5.70	4.90	5.00	3.10	3.30	5.00	9.00	19.0	22.0	5.60	3.60	3.00
11	4.80	5.30	5.00	3.20	3.20	5.00	8.00	18.0	19.0	5.60	3.40	3.00
12	4.80	5.40	5.00	3.40	4.00	5.00	7.00	18.0	17.0	5.30	3.60	3.00
13	4.80	5.10	5.00	3.40	4.00	5.00	8.00	17.0	16.0	5.10	3.60	3.00
14	4.80	5.40	5.00	3.30	4.20	5.00	9.80	19.0	15.0	5.00	3.20	3.00
15	4.80	4.80	5.00	3.20	4.10	5.00	10.0	23.0	13.0	5.00	3.40	3.00
16	4.50	5.00	5.00	3.30	4.40	5.00	10.0	26.0	12.0	5.00	3.60	3.00
17	4.50	5.00	5.00	3.20	4.60	5.00	10.0	25.0	11.0	5.00	4.00	3.00
18	4.50	4.80	5.00	3.50	4.50	5.00	10.0	24.0	11.0	5.00	4.00	3.00
19	4.50	5.00	5.00	3.50	4.40	5.00	10.0	22.0	10.0	5.00	3.70	3.00
20	5.10	5.00	5.00	3.30	4.20	5.00	10.0	22.0	10.0	4.00	3.20	3.00
21	5.10	5.00	5.00	3.10	4.40	5.00	12.0	23.0	9.80	4.00	3.70	3.00
22	5.20	5.00	5.00	3.10	4.40	5.00	13.0	23.0	10.0	4.00	3.70	3.00
23	4.70	5.00	5.00	3.10	4.30	5.00	14.0	22.0	9.30	4.00	3.60	3.00
24	4.40	5.00	5.00	3.00	4.20	5.00	14.0	23.0	9.00	4.00	3.70	3.00
25	3.90	5.00	5.00	3.10	4.20	5.00	15.0	25.0	8.70	4.00	3.90	3.00
26	3.70	6.00	5.00	3.30	4.20	5.00	15.0	30.0	8.60	4.00	4.00	3.00
27	3.90	6.00	5.00	3.20	4.20	5.00	14.0	34.0	8.30	4.00	3.70	3.00
28	3.70	5.60	5.00	3.00	4.30	5.00	14.0	34.0	7.60	4.00	3.70	3.00
29	3.70	6.00	5.00	3.00	5.00	5.00	13.0	32.0	6.80	4.00	3.40	3.00
30	3.10	6.00	5.00	2.80	---	5.00	13.0	29.0	6.50	4.00	3.40	3.00
31	4.10	---	4.50	2.60	---	5.00	---	26.0	---	4.00	3.20	---

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY

STATION NUMBER 09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH
LATITUDE 394628 LONGITUDE 1111125 STATE 49 COUNTY 007

MAXIMUM DISCHARGE, IN CUBIC FEET PER SECOND
FOR WATER YEARS 1931, 1939-84

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34.0	30.0	25.0	20.0	20.0	24.0	49.0	305.0	1100.	227.0	52.0	28.0
2	35.0	28.0	22.0	20.0	21.0	25.0	66.0	350.0	1110.	208.0	52.0	29.0
3	34.0	33.0	20.0	20.0	25.0	26.0	67.0	488.0	1050.	195.0	45.0	28.0
4	32.0	36.0	21.0	20.0	23.0	28.0	60.0	611.0	986.0	178.0	42.0	44.0
5	27.0	36.0	21.0	20.0	20.0	30.0	65.0	684.0	931.0	165.0	42.0	32.0
6	26.0	33.0	20.0	20.0	20.0	32.0	68.0	740.0	947.0	153.0	40.0	30.0
7	26.0	33.0	22.0	20.0	20.0	35.0	65.0	750.0	931.0	138.0	40.0	27.0
8	26.0	34.0	22.0	20.0	20.0	31.0	77.0	719.0	954.0	133.0	45.0	27.0
9	25.0	37.0	21.0	20.0	20.0	34.0	91.0	674.0	950.0	131.0	39.0	26.0
10	24.0	33.0	22.0	20.0	20.0	32.0	98.0	749.0	974.0	121.0	45.0	25.0
11	24.0	31.0	20.0	20.0	20.0	31.0	90.0	674.0	1040.	106.0	46.0	25.0
12	23.0	28.0	20.0	20.0	20.0	29.0	115.0	756.0	1040.	100.0	45.0	26.0
13	26.0	28.0	20.0	20.0	20.0	27.0	125.0	848.0	858.0	88.0	40.0	24.0
14	26.0	25.0	20.0	20.0	20.0	24.0	150.0	940.0	720.0	83.0	37.0	23.0
15	24.0	26.0	20.0	20.0	20.0	27.0	175.0	917.0	686.0	78.0	39.0	23.0
16	25.0	28.0	20.0	20.0	20.0	26.0	175.0	850.0	713.0	75.0	44.0	23.0
17	25.0	31.0	20.0	20.0	20.0	28.0	200.0	839.0	765.0	70.0	39.0	28.0
18	25.0	32.0	20.0	20.0	20.0	32.0	230.0	924.0	782.0	66.0	38.0	26.0
19	24.0	32.0	20.0	21.0	20.0	34.0	260.0	1010.	772.0	64.0	38.0	26.0
20	22.0	29.0	20.0	22.0	20.0	32.0	300.0	1050.	679.0	62.0	45.0	27.0
21	25.0	30.0	20.0	24.0	20.0	34.0	270.0	1100.	595.0	61.0	37.0	29.0
22	21.0	27.0	21.0	21.0	20.0	38.0	250.0	1310.	524.0	64.0	34.0	25.0
23	24.0	21.0	22.0	24.0	20.0	38.0	280.0	1270.	471.0	70.0	33.0	28.0
24	34.0	23.0	22.0	23.0	20.0	36.0	320.0	1240.	429.0	65.0	55.0	28.0
25	32.0	24.0	21.0	21.0	20.0	33.0	370.0	1180.	396.0	69.0	47.0	27.0
26	39.0	22.0	20.0	21.0	20.0	35.0	368.0	1150.	370.0	61.0	29.0	26.0
27	42.0	21.0	20.0	20.0	21.0	40.0	384.0	1110.	334.0	56.0	35.0	52.0
28	34.0	22.0	20.0	20.0	22.0	41.0	362.0	1000.	302.0	53.0	34.0	44.0
29	30.0	24.0	20.0	20.0	23.0	42.0	368.0	943.0	280.0	50.0	28.0	38.0
30	31.0	27.0	20.0	21.0	---	42.0	362.0	1060.	252.0	51.0	28.0	35.0
31	35.0	---	20.0	20.0	---	42.0	---	1220.	---	50.0	27.0	---

UNITED STATES DEPARTMENT OF THE INTERIOR - GEOLOGICAL SURVEY

STATION NUMBER 09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH
LATITUDE 394628 LONGITUDE 1111125 STATE 49 COUNTY 007

MEAN DISCHARGE, IN CUBIC FEET PER SECOND
FOR WATER YEARS 1931, 1939-84

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11.3	11.7	10.2	8.72	8.70	10.1	18.5	122.5	278.1	50.9	20.0	11.0
2	11.7	11.4	10.2	8.64	8.71	10.3	19.5	134.6	266.9	48.3	19.7	10.8
3	11.6	11.3	9.98	8.62	8.78	10.3	20.3	153.7	260.3	46.4	19.0	10.9
4	11.8	11.7	10.2	8.61	8.78	10.2	20.9	169.3	248.9	44.1	18.6	11.3
5	11.7	11.7	10.2	8.62	8.75	10.3	21.7	181.9	239.2	42.1	18.1	11.0
6	11.5	11.4	10.0	8.60	8.74	10.5	22.7	197.4	232.6	40.3	17.7	11.5
7	11.4	11.5	10.0	8.58	8.84	10.8	23.4	215.9	223.0	38.4	17.3	11.4
8	11.2	11.8	9.95	8.58	8.87	10.8	25.1	223.0	210.0	37.1	16.9	11.4
9	11.0	11.7	9.85	8.62	8.94	10.9	26.9	234.2	194.4	36.3	16.3	11.3
10	11.2	11.4	9.83	8.64	8.85	10.9	28.7	253.0	182.9	34.9	16.1	11.2
11	11.3	11.4	9.75	8.64	8.83	11.0	30.3	262.5	173.5	33.0	15.8	11.2
12	11.3	11.2	9.67	8.64	8.86	11.1	32.9	270.6	161.7	31.7	15.4	11.2
13	11.5	11.4	9.67	8.64	8.88	11.0	37.9	275.6	150.2	30.4	15.2	11.1
14	11.3	11.2	9.68	8.62	8.93	11.0	42.6	284.1	140.5	29.4	15.3	11.1
15	11.3	11.1	9.69	8.63	8.92	11.0	46.0	294.2	133.1	28.8	14.8	10.7
16	11.2	11.0	9.58	8.59	9.02	11.2	50.6	300.1	126.6	28.0	14.7	10.7
17	11.0	11.1	9.52	8.64	8.98	11.5	56.4	306.3	120.3	28.0	14.7	10.6
18	10.9	11.4	9.51	8.62	9.07	11.7	60.2	309.2	114.7	26.8	14.9	10.7
19	11.0	11.5	9.49	8.61	9.06	11.7	63.1	319.4	107.6	25.9	14.6	11.1
20	11.2	11.2	9.51	8.72	9.03	11.8	67.2	331.8	99.7	25.0	14.4	10.9
21	11.2	11.2	9.47	8.85	9.17	12.2	73.4	345.1	93.8	24.8	14.4	11.2
22	10.9	11.0	9.54	8.82	9.20	12.5	79.2	350.3	87.2	24.2	14.2	11.0
23	11.0	10.8	9.60	8.89	9.27	12.7	85.5	348.4	80.5	23.8	13.5	10.7
24	11.4	10.8	9.55	8.91	9.39	13.0	91.9	342.4	76.6	23.5	13.5	10.5
25	11.4	10.8	9.40	8.91	9.45	13.2	96.7	334.5	73.4	23.2	13.2	10.5
26	11.3	10.6	9.28	8.85	9.38	13.6	99.4	328.9	70.0	22.7	12.7	10.9
27	11.5	10.6	9.28	8.76	9.36	14.0	100.8	325.2	65.7	22.1	12.1	11.4
28	12.0	10.5	9.23	8.73	9.35	14.3	103.9	319.9	61.1	21.4	11.9	11.4
29	11.9	10.6	9.15	8.73	10.1	14.9	110.7	309.2	57.4	20.7	11.9	11.3
30	12.0	10.7	9.12	8.80	---	15.3	116.7	300.2	54.0	20.8	11.7	11.5
31	11.9	---	9.14	8.81	---	15.9	---	293.3	---	20.4	11.5	---

0.25 × 2.5 = 0.625 8.1
0.5 × 2.5 = 1.25 8.75 9.1
0.75 × 2.5 = 1.875 9.375

STREAM FLOW (CFS)
MEAN

FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH STATION # 09310500
WATER YEAR - 1978

DAY	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT
1	4.50	5.30	8.10	8.00	8.00	12.00	41.00	80.00	554.00	67.00	17.00	9.80
2	4.80	5.50	8.60	8.00	8.00	13.00	38.00	85.00	546.00	64.00	15.00	9.80
3	4.50	5.20	7.70	8.00	8.00	15.00	35.00	96.00	534.00	61.00	15.00	11.00
4	4.20	5.30	7.80	8.00	8.00	13.00	28.00	112.00	522.00	57.00	14.00	9.80
5	4.50	5.10	6.80	8.00	8.00	13.00	32.00	97.00	491.00	55.00	14.00	9.80
6	5.40	6.30	7.80	8.00	8.00	13.00	30.00	87.00	438.00	51.00	14.00	9.80
7	11.00	6.20	7.70	8.00	8.00	13.00	29.00	76.00	428.00	48.00	13.00	11.00
8	8.20	5.90	6.60	8.00	8.00	13.00	27.00	70.00	421.00	46.00	13.00	12.00
9	6.70	4.60	7.60	8.00	8.00	13.00	29.00	71.00	403.00	44.00	12.00	11.00
10	5.70	4.90	8.00	8.00	8.00	13.00	34.00	90.00	382.00	41.00	12.00	10.00
11	4.80	5.30	8.00	8.00	8.00	13.00	43.00	123.00	356.00	40.00	11.00	11.00
12	4.80	5.40	8.00	8.00	8.00	13.00	53.00	154.00	311.00	38.00	12.00	12.00
13	4.80	5.10	8.00	8.00	8.00	13.00	58.00	214.00	293.00	37.00	15.00	12.00
14	4.80	5.40	8.00	8.00	8.00	13.00	49.00	330.00	282.00	35.00	16.00	11.00
15	4.80	4.80	8.00	8.00	8.00	13.00	52.00	472.00	276.00	34.00	14.00	11.00
16	4.50	5.00	8.00	8.00	8.00	13.00	62.00	535.00	262.00	31.00	13.00	11.00
17	4.50	5.20	8.00	8.00	8.00	13.00	49.00	378.00	232.00	30.00	11.00	11.00
18	4.50	4.80	8.00	8.00	8.00	13.00	43.00	286.00	211.00	27.00	11.00	14.00
19	4.50	5.90	8.00	8.00	8.00	15.00	37.00	260.00	189.00	27.00	11.00	13.00
20	5.10	6.80	8.00	8.00	8.00	17.00	39.00	307.00	170.00	25.00	10.00	12.00
21	6.70	7.00	8.00	8.00	10.00	18.00	49.00	431.00	150.00	24.00	11.00	12.00
22	6.00	7.30	8.00	8.00	10.00	23.00	43.00	595.00	134.00	23.00	9.80	12.00
23	5.70	7.60	8.00	8.00	10.00	28.00	40.00	674.00	120.00	23.00	11.00	11.00
24	5.10	8.00	8.00	8.00	10.00	25.00	47.00	650.00	109.00	22.00	55.00	9.80
25	4.80	8.00	8.00	8.00	10.00	27.00	66.00	624.00	104.00	20.00	47.00	9.40
26	4.80	8.00	8.00	8.00	10.00	25.00	97.00	620.00	99.00	20.00	28.00	9.00
27	4.80	8.60	8.00	8.00	10.00	24.00	113.00	596.00	93.00	19.00	15.00	9.40
28	4.90	8.60	8.00	8.00	10.00	23.00	97.00	570.00	87.00	19.00	12.00	9.00
29	4.60	7.90	8.00	8.00		25.00	97.00	630.00	76.00	19.00	11.00	9.40
30	6.00	8.20	8.00	8.00		29.00	86.00	643.00	71.00	18.00	11.00	9.00
31	5.60		8.00	8.00		33.00		609.00		17.00	10.00	
AVG	5.34	6.23	7.89	8.00	8.57	17.64	51.43	340.80	278.13	34.90	15.60	10.73
MAX	11.00	8.60	8.60	8.00	10.00	33.00	113.00	674.00	554.00	67.00	55.00	14.00
MIN	4.20	4.60	6.60	8.00	8.00	12.00	27.00	70.00	71.00	17.00	9.80	9.00

WATER YEAR 1978 TOTAL = 23972.28 MAX = 674.00 MIN = 4.20 AVG = 65.67

STREAM FLOW (CFS)
MEAN

FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH STATION # 09310500
WATER YEAR - 1979

DAY	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT
1	9.00	9.40	8.60	4.00	2.70	4.60	7.70	104.00	318.00	49.00	13.00	7.80
2	8.60	10.00	8.50	3.80	2.80	4.60	7.60	102.00	281.00	44.00	13.00	7.80
3	8.60	9.80	8.30	3.90	2.70	4.90	7.50	107.00	259.00	43.00	13.00	7.80
4	7.50	10.00	8.30	4.00	2.70	4.90	7.60	130.00	244.00	42.00	13.00	7.80
5	6.00	9.90	8.40	4.20	3.00	5.20	7.90	166.00	231.00	40.00	12.00	8.20
6	5.70	9.60	8.00	4.00	3.20	5.60	8.80	189.00	221.00	39.00	11.00	8.20
7	5.70	9.60	7.50	3.80	3.20	6.40	9.50	157.00	209.00	37.00	12.00	7.80
8	5.70	9.60	7.00	3.10	3.50	7.00	10.00	132.00	190.00	35.00	13.00	7.50
9	5.70	10.00	6.80	3.00	3.30	7.10	11.00	113.00	176.00	34.00	12.00	7.60
10	5.70	10.00	6.90	3.10	3.30	7.10	10.00	100.00	160.00	29.00	11.00	8.50
11	5.70	9.90	6.50	3.20	3.20	7.20	8.00	90.00	147.00	27.00	11.00	8.20
12	5.70	9.80	6.40	3.40	4.00	7.40	7.00	87.00	136.00	26.00	11.00	7.50
13	5.40	9.70	6.20	3.40	4.00	7.60	8.00	100.00	127.00	25.00	13.00	7.50
14	5.40	9.50	6.00	3.30	4.20	7.70	9.80	133.00	118.00	24.00	14.00	7.50
15	5.40	9.40	6.00	3.20	4.10	7.40	12.00	197.00	113.00	23.00	15.00	7.50
16	5.70	10.00	5.90	3.30	4.40	7.00	15.00	274.00	106.00	22.00	14.00	7.50
17	6.00	9.70	5.60	3.20	4.60	7.20	20.00	357.00	100.00	21.00	14.00	7.50
18	5.70	9.60	5.50	3.50	4.50	7.00	25.00	430.00	95.00	21.00	15.00	7.50
19	5.40	9.70	5.80	3.50	4.40	7.20	24.00	524.00	91.00	20.00	13.00	7.30
20	5.20	9.10	5.80	3.30	4.20	7.00	26.00	563.00	87.00	21.00	13.00	7.10
21	5.10	9.30	5.50	3.10	4.40	7.20	32.00	605.00	83.00	24.00	13.00	7.80
22	5.40	9.30	5.70	3.10	4.40	7.20	42.00	651.00	77.00	29.00	12.00	7.80
23	5.00	9.20	5.70	3.10	4.30	7.00	46.00	650.00	73.00	25.00	11.00	7.50
24	5.20	9.30	5.70	3.00	4.20	7.00	51.00	643.00	70.00	24.00	11.00	7.10
25	5.90	9.50	5.80	3.10	4.20	7.20	52.00	575.00	68.00	20.00	10.00	7.10
26	5.60	9.10	5.60	3.30	4.20	7.50	56.00	555.00	63.00	18.00	10.00	7.30
27	6.10	9.00	5.60	3.20	4.20	7.70	64.00	591.00	59.00	17.00	10.00	7.10
28	7.00	8.50	5.60	3.00	4.30	7.60	76.00	664.00	56.00	17.00	9.40	6.80
29	7.80	8.50	5.40	3.00		7.80	92.00	589.00	53.00	15.00	9.00	6.90
30	9.40	8.60	5.20	2.80		7.80	98.00	452.00	51.00	14.00	8.60	7.10
31	9.50		4.50	2.60		7.80		370.00		14.00	8.20	
AVG	6.31	9.48	6.39	3.33	3.79	6.83	28.37	335.48	135.39	27.06	11.87	7.55
MAX	9.50	10.00	8.60	4.20	4.60	7.80	98.00	664.00	318.00	49.00	15.00	8.50
MIN	5.00	8.50	4.50	2.60	2.70	4.60	7.00	87.00	51.00	14.00	8.20	6.80

WATER YEAR 1979 TOTAL = 17847.48 MAX = 664.00 MIN = 2.60 AVG = 48.89

Fish Creek
1931 - 1984

STATION 09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

DISCHARGE, IN CUBIC FEET PER SECOND
MONTHLY AND ANNUAL MEANS

YEAR	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	ANNUAL
1931	*	*	*	*	*	*	*	*	24.47	6.29	4.	3.3	9.44
1939	11.48	11.	10.	10.	9.	12.	101.63	131.84	34.5	12.87	8.23	7.27	30.06
1940	8.87	10.2	8.94	7.	8.	10.87	71.97	281.97	42.47	15.81	6.29	7.93	40.28
1941	7.74	7.53	7.	6.	7.	9.03	20.2	367.35	139.3	35.19	17.23	14.43	53.63
1942	19.03	15.77	14.42	12.	10.	14.1	118.93	294.	134.93	33.58	15.13	7.4	57.7
1943	9.77	10.6	10.	8.	8.	9.35	100.53	129.9	127.3	30.	16.35	8.57	39.04
1944	11.8	10.05	9.	8.	8.	10.	22.73	313.48	196.43	36.55	13.06	9.17	54.21
1945	9.95	10.87	7.	7.	8.	9.	20.5	301.84	158.53	38.74	23.52	13.63	51.06
1946	12.13	12.83	9.29	8.	8.29	9.39	140.6	167.84	50.37	20.81	12.02	6.31	38.24
1947	11.09	8.9	8.35	7.39	8.68	17.1	76.63	281.03	69.77	29.23	17.81	10.12	45.86
1948	10.6	10.8	8.66	7.5	6.72	8.68	35.2	203.58	54.03	19.87	8.01	6.26	31.85
1949	9.15	9.6	9.4	8.	7.4	12.02	94.23	320.03	114.4	29.68	13.57	9.47	53.41
1950	12.42	11.33	9.	8.	8.	9.	68.33	236.68	110.33	31.1	14.77	12.53	44.52
1951	10.05	11.18	7.84	5.84	5.7	7.87	83.63	258.9	98.	29.61	19.32	10.1	45.94
1952	12.39	10.53	9.16	8.	8.	8.26	75.9	680.61	359.9	60.48	32.16	18.13	107.4
1953	14.74	17.33	15.	13.	11.36	15.32	38.97	182.42	157.87	35.42	19.9	11.05	44.51
1954	10.71	10.6	9.65	9.	10.	10.52	74.37	124.81	34.53	16.58	8.03	8.97	27.4
1955	8.65	9.4	8.4	8.	8.	10.39	32.03	219.	78.03	23.29	14.97	8.38	35.98
1956	8.51	8.3	8.	7.6	7.4	9.39	74.57	246.84	60.73	20.	11.55	7.02	39.35
1957	8.43	8.15	6.5	6.	7.29	10.58	31.03	216.68	354.4	53.9	23.48	14.43	61.75
1958	15.77	12.17	7.	6.	6.64	8.19	41.7	417.39	132.33	27.68	14.13	11.12	58.87
1959	9.01	8.35	7.71	7.48	7.23	8.35	21.63	111.68	41.27	12.9	6.67	7.24	20.92
1960	7.2	7.55	6.32	6.	6.	12.48	47.37	187.74	56.77	18.74	7.52	5.12	30.89
1961	7.15	10.35	9.61	7.	6.	6.19	18.8	68.55	22.87	8.97	5.08	7.66	14.93
1962	6.18	6.75	5.16	5.	6.89	6.97	166.7	357.58	130.77	31.77	15.16	12.25	62.88
1963	10.34	10.09	6.32	6.29	9.91	10.1	22.93	209.13	67.37	19.65	14.61	11.35	33.42
1964	7.75	8.22	6.16	5.	5.	5.	17.6	253.06	125.8	29.48	14.19	10.72	40.86
1965	8.22	6.01	5.42	5.	5.46	10.23	36.53	294.23	224.23	48.68	28.9	22.	58.18
1966	17.23	15.3	9.94	7.89	8.	19.03	102.5	167.13	38.77	16.81	12.08	8.03	35.38
1967	12.14	9.59	9.74	9.	9.	11.35	24.9	245.03	202.23	42.81	18.06	11.93	50.7
1968	10.61	10.13	9.05	9.49	10.69	14.55	20.7	255.1	230.4	36.39	21.97	14.7	53.71
1969	13.84	13.4	8.29	7.4	7.41	11.4	101.8	451.84	105.17	36.39	17.35	13.1	66.17
1970	14.77	11.74	10.48	10.	10.	13.97	21.77	289.97	145.03	38.68	14.88	13.77	49.93
1971	11.95	13.17	19.1	20.29	20.25	24.1	77.47	275.61	110.97	28.29	13.74	10.14	52.34
1972	11.39	12.67	10.31	9.35	10.21	31.65	65.1	158.48	45.17	13.29	8.46	9.82	32.27
1973	12.42	11.97	11.23	12.68	12.	12.06	27.73	474.87	147.3	30.77	14.	10.96	65.43
1974	11.61	11.03	10.	10.	10.	11.52	30.97	322.45	60.3	21.45	10.49	7.04	43.52
1975	9.03	11.82	9.24	9.65	10.	10.	11.53	175.19	436.67	51.81	20.	14.97	64.01
1976	14.94	14.	14.	14.	14.	14.1	26.37	227.23	48.63	18.26	9.98	8.03	35.53
1977	8.24	8.36	7.28	5.58	5.53	5.68	28.95	23.48	14.39	6.83	4.07	3.49	10.15
1978	5.34	6.24	7.89	8.	8.57	17.65	51.43	340.81	278.13	34.9	15.61	10.73	65.68
1979	6.32	9.49	6.4	3.34	3.79	6.84	28.38	335.48	135.4	27.06	11.88	7.55	48.9
1980	8.2	9.18	9.67	9.52	9.85	9.69	77.05	476.03	332.3	43.29	17.58	15.77	84.99
1981	13.65	12.22	15.06	9.87	13.91	17.23	67.6	120.71	71.93	15.7	8.45	10.25	31.43
1982	7.81	5.89	23.48	80.77	28.5	27.58	81.	259.75	347.44	*	*	*	90.
PER	10.65	10.5	9.56	9.98	9.08	12.02	56.83	260.4	131.45	28.17	14.19	10.28	47.21

* INDICATES A NO-VALUE MONTH

Q mean
377.6040

.03

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0.02

1984 WY UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH PROCESS DATE: 07-JUN-85 15:36 PF
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

PROVISIONAL DATA DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1983 TO SEPTEMBER 1984
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	22	18	20	20	24	19	65	865	113	44	22
2	35	21	17	20	20	24	19	65	758	107	40	21
3	34	19	17	20	20	21	18	69	671	102	38	21
4	32	19	17	20	20	18	17	72	588	95	37	21
5	27	19	17	20	20	17	18	80	550	90	35	20
6	26	18	19	20	20	19	20	83	618	83	35	20
7	25	18	22	20	20	20	20	78	671	78	34	20
8	23	22	22	20	20	20	20	90	588	74	33	19
9	23	20	21	20	20	20	20	138	499	72	32	19
10	22	20	20	20	20	20	20	216	458	69	31	19
11	22	19	20	18	20	20	18	310	410	65	31	22
12	21	19	20	17	20	20	18	407	375	62	32	26
13	21	21	20	16	20	21	20	530	351	64	31	24
14	24	21	20	15	20	23	24	633	341	62	32	22
15	24	20	20	14	20	21	33	798	328	60	32	21
16	23	21	19	13	18	19	48	850	297	58	31	21
17	23	20	17	13	18	18	64	795	282	54	30	20
18	23	22	16	13	18	19	80	798	268	52	29	20
19	22	22	16	13	18	19	92	831	255	51	30	20
20	21	21	16	14	18	19	79	911	239	50	30	20
21	19	20	17	15	19	17	66	1100	224	53	29	29
22	19	20	19	17	20	17	61	1310	206	58	28	24
23	19	20	22	18	20	17	70	1270	186	53	27	21
24	21	20	22	19	20	18	95	1240	168	51	25	20
25	19	20	21	20	20	17	111	1180	155	51	29	20
26	19	20	20	20	20	16	94	1150	143	51	27	20
27	19	20	20	20	21	16	80	1110	129	55	25	20
28	19	20	20	20	22	16	72	1000	116	53	24	19
29	19	20	20	20	23	16	70	919	107	50	23	19
30	19	20	20	20	---	18	66	884	107	51	23	18
31	22	---	20	20	---	19	---	861	---	45	23	---
TOTAL	719	604	595	555	575	589	1452	19843	10953	2032	950	628
MEAN	23.2	20.1	19.2	17.9	19.8	19.0	48.4	640	365	65.5	30.6	20.9
MAX	35	22	22	20	23	24	111	1310	865	113	44	29
MIN	19	18	16	13	18	16	17	65	107	45	23	18
AC-FT	1430	1200	1180	1100	1140	1170	2880	39360	21730	4030	1880	1250

CAL YR 1983	TOTAL	40937	MEAN	112	MAX	1220	MIN	11	AC-FT	81200
WTR YR 1984	TOTAL	39495	MEAN	108	MAX	1310	MIN	13	AC-FT	78340

UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

PROCESS DATE: 07-JUN-85 15:36 PF

PROVISIONAL DATA DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	33	30	25	14	14	17	19	68	1100	227	52	28
2	27	28	22	14	11	19	19	66	1110	208	52	29
3	26	33	20	15	12	19	18	67	1050	195	45	28
4	26	36	21	16	13	18	18	73	986	178	42	44
5	26	36	21	17	14	18	17	93	931	165	42	32
6	26	33	20	17	13	17	17	99	947	153	40	30
7	26	33	20	17	15	17	19	99	931	138	39	27
8	26	34	20	16	16	18	20	132	954	133	39	27
9	25	37	19	17	18	17	23	169	950	131	38	26
10	24	33	19	17	16	19	25	173	974	121	37	25
11	24	31	19	17	16	21	22	171	1040	106	46	25
12	23	28	18	15	16	22	21	157	1040	100	45	23
13	24	28	19	15	17	23	20	143	858	88	40	23
14	24	25	20	16	18	22	19	139	720	83	37	23
15	24	26	20	16	16	20	19	134	686	78	39	23
16	25	28	19	16	17	19	20	132	713	75	44	23
17	25	31	19	16	13	21	21	126	765	70	39	23
18	25	32	19	15	16	20	24	124	782	66	38	22
19	24	32	17	14	17	19	28	122	772	64	38	22
20	22	29	18	16	16	18	34	122	679	62	45	22
21	22	30	19	16	16	17	38	155	595	61	37	22
22	21	27	21	16	16	19	40	203	524	64	34	23
23	21	21	20	15	16	19	50	268	471	70	32	26
24	22	23	18	16	17	18	71	360	429	65	29	28
25	26	24	15	18	18	19	79	500	396	69	29	27
26	39	22	12	17	17	21	74	651	370	61	29	26
27	42	21	13	18	16	19	68	764	334	56	27	34
28	34	22	13	17	16	18	68	907	302	53	27	34
29	30	24	12	15	---	18	73	943	280	49	27	29
30	31	27	11	16	---	20	71	1060	252	48	28	35
31	35	---	13	16	---	20	---	1220	---	50	27	---
TOTAL	828	864	562	496	436	592	1055	9440	21941	3087	1163	809
MEAN	26.7	28.8	18.1	16.0	15.6	19.1	35.2	305	731	99.6	37.5	27.0
MAX	42	37	25	18	18	23	79	1220	1110	227	52	44
MIN	21	21	11	14	11	17	17	66	252	48	27	22
AC-FT	1640	1710	1110	984	865	1170	2090	18720	43520	6120	2310	1600

CAL YR 1982	TOTAL	24047.0	MEAN	65.9	MAX	615	MIN	6.6	AC-FT	47700	
WTR YR 1983	TOTAL	41273	MEAN	113	MAX	1220	MIN	11	AC-FT	81860	

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH PROCESS DATE: 07-JUN-85 15:36 PF
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	13	12	8.3	7.9	8.4	12	280	350	56	29	14
2	11	12	11	8.2	8.3	9.2	13	300	315	53	28	13
3	12	12	11	8.5	8.2	8.8	14	330	290	51	27	13
4	18	11	11	8.2	7.9	8.4	14	350	260	50	26	13
5	14	11	11	7.6	7.7	8.0	15	355	240	51	25	13
6	12	11	11	7.1	7.0	7.7	15	280	215	51	24	13
7	15	11	11	6.6	7.3	7.8	15	270	195	48	23	13
8	21	11	11	7.2	7.9	8.1	15	290	180	47	22	13
9	16	10	10	7.3	8.3	8.3	16	310	165	55	22	13
10	15	10	10	7.8	7.7	8.4	17	275	175	47	21	15
11	23	9.9	10	8.1	8.0	8.9	30	240	180	45	21	17
12	19	9.9	10	8.6	7.5	8.6	42	210	179	42	23	15
13	15	10	10	8.3	7.6	8.8	39	190	163	40	23	20
14	12	11	11	8.0	7.8	8.7	48	220	175	38	23	22
15	11	13	11	8.4	8.2	8.6	66	250	160	37	21	20
16	15	12	9.7	8.7	8.4	9.3	71	285	150	35	20	18
17	13	12	8.4	9.4	8.2	9.2	77	335	153	35	20	17
18	12	12	9.0	8.8	8.5	9.3	83	390	160	33	20	15
19	11	8.0	10	8.4	8.0	9.0	79	385	150	33	18	15
20	10	9.6	9.5	8.6	7.9	10	75	330	128	32	16	15
21	9.9	11	8.5	8.5	7.8	9.9	70	480	130	32	15	15
22	9.8	11	8.9	8.3	8.1	8.3	54	520	132	33	17	14
23	9.7	12	11	8.2	7.8	9.8	58	560	129	34	16	14
24	9.4	12	9.7	8.1	7.6	11	68	575	120	35	15	14
25	9.2	12	8.6	8.0	7.9	11	80	590	113	35	14	15
26	9.0	9.6	8.4	8.3	7.7	14	100	600	106	40	14	26
27	8.8	11	8.1	8.1	8.0	13	120	615	93	45	14	52
28	10	9.8	8.3	7.9	7.6	12	150	560	81	42	14	44
29	13	11	8.2	7.7	---	12	190	490	68	36	16	38
30	16	13	8.5	7.3	---	11	230	420	58	34	14	34
31	11	---	8.7	7.2	---	10	---	390	---	30	14	---
TOTAL	401.8	331.8	304.5	249.7	220.8	295.5	1876	11675	5013	1275	615	573
MEAN	13.0	11.1	9.82	8.05	7.89	9.53	62.5	377	167	41.1	19.8	19.1
MAX	23	13	12	9.4	8.5	14	230	615	350	56	29	52
MIN	8.8	8.0	8.1	6.6	7.0	7.7	12	190	58	30	14	13
AC-FT	797	658	604	495	438	586	3720	23160	9940	2530	1220	1140

CAL YR 1981	TOTAL	11252.1	MEAN	30.8	MAX	250	MIN	5.4	AC-FT	22320
WTR YR 1982	TOTAL	22831.1	MEAN	62.6	MAX	615	MIN	6.6	AC-FT	45290

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH PROCESS DATE: 07-JUN-85 15:36 PP
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	14	15	14	10	16	31	196	145	31	6.7	8.4
2	14	13	16	13	9.8	17	33	211	150	32	6.7	7.5
3	13	12	15	11	9.0	16	38	250	170	32	6.4	7.5
4	13	12	15	9.6	9.8	16	30	175	130	31	6.2	6.8
5	13	12	15	9.0	10	16	24	155	120	29	5.8	8.6
6	12	12	15	9.4	10	16	30	142	115	18	5.6	12
7	12	12	15	9.4	11	17	42	126	100	20	5.4	11
8	12	12	13	9.5	11	17	22	120	95	17	5.8	10
9	11	11	13	9.5	11	17	26	109	90	15	5.9	12
10	11	11	14	9.5	10	17	29	103	90	17	8.2	14
11	11	11	15	9.4	11	17	30	107	95	16	13	13
12	12	13	15	9.4	12	17	30	100	85	15	12	10
13	17	15	15	9.4	12	17	31	91	65	16	13	11
14	14	13	14	9.0	13	18	35	88	60	14	12	12
15	15	10	15	9.0	14	18	46	89	56	13	10	10
16	15	9.6	16	8.9	15	16	57	93	54	13	11	9.9
17	15	10	16	9.2	17	14	71	90	51	19	10	9.8
18	14	11	16	9.5	18	15	77	85	48	14	9.1	9.8
19	14	11	16	9.8	17	14	82	83	47	13	9.3	9.5
20	14	12	16	9.8	17	11	63	84	45	11	9.0	9.4
21	14	11	16	10	17	12	56	95	42	10	7.9	9.8
22	14	11	15	10	17	17	57	100	39	9.4	10	9.8
23	13	11	14	10	18	20	75	104	37	9.6	9.2	9.8
24	14	11	15	9.8	18	27	101	106	35	11	8.6	10
25	15	13	15	9.6	18	23	131	102	33	11	7.9	11
26	13	13	16	9.6	18	18	149	107	33	10	7.2	11
27	13	14	16	9.8	18	18	143	121	33	9.1	6.8	11
28	14	15	15	10	18	17	147	119	32	7.8	7.5	11
29	17	16	15	10	---	16	158	121	32	8.2	7.5	11
30	17	15	15	10	---	19	184	130	31	7.5	9.1	11
31	14	---	15	10	---	25	---	140	---	7.1	9.2	---
TOTAL	423	366.6	467	306.1	389.6	534	2028	3742	2158	486.7	262.0	307.6
MEAN	13.6	12.2	15.1	9.87	13.9	17.2	67.6	121	71.9	15.7	8.45	10.3
MAX	17	16	16	14	18	27	184	250	170	32	13	14
MIN	11	9.6	13	8.9	9.0	11	22	83	31	7.1	5.4	6.8
AC-FT	839	727	926	607	773	1060	4020	7420	4280	965	520	610

CAL YR 1980	TOTAL	31535.3	MEAN	86.2	MAX	950	MIN	9.0	AC-FT	62550
WTR YR 1981	TOTAL	11470.6	MEAN	31.4	MAX	250	MIN	5.4	AC-FT	22750

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH PROCESS DATE: 07-JUN-85 15:36 PF
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.4	8.7	9.0	9.6	9.7	10	9.5	169	541	81	22	15
2	7.4	8.9	9.3	9.4	9.8	9.8	10	179	521	80	22	15
3	7.1	8.9	9.9	9.5	9.8	9.6	10	214	549	74	22	15
4	7.1	9.0	11	9.7	10	9.9	10	222	594	69	22	15
5	7.1	9.3	10	9.7	10	9.7	10	290	659	67	20	15
6	7.1	9.3	9.6	9.6	10	9.7	11	400	664	63	20	15
7	7.1	9.2	9.8	9.4	10	9.7	12	560	574	59	19	15
8	7.3	9.3	10	9.5	9.8	9.8	15	480	545	61	18	21
9	7.5	9.0	9.9	9.4	9.8	9.6	17	530	521	58	18	23
10	7.5	8.9	9.8	9.5	10	9.8	21	560	493	56	18	22
11	7.4	8.7	9.8	9.4	10	9.7	30	425	461	52	17	21
12	7.1	9.2	9.2	9.7	10	9.6	37	360	409	47	16	20
13	7.1	9.6	9.0	9.9	10	9.7	50	310	357	45	16	19
14	7.1	9.8	9.7	9.9	9.8	9.9	60	330	340	46	17	18
15	7.1	10	10	9.8	10	9.8	75	360	322	41	18	17
16	7.3	9.8	9.8	9.5	10	9.6	90	410	298	38	18	17
17	7.5	9.6	9.6	9.6	10	9.6	105	440	271	36	17	16
18	7.8	9.4	9.7	9.5	9.7	9.7	120	405	246	33	16	15
19	8.7	9.0	9.6	9.4	9.8	9.7	130	480	222	32	16	15
20	10	9.0	10	9.2	9.8	9.9	125	550	206	30	16	14
21	9.5	9.0	9.6	9.3	9.7	9.8	115	650	186	28	16	14
22	9.6	9.0	9.7	9.2	9.8	9.8	105	800	155	27	15	14
23	9.7	9.2	9.5	9.5	9.7	9.8	100	950	137	26	15	14
24	9.8	9.4	9.4	9.7	9.5	9.5	94	910	125	27	16	13
25	10	9.3	9.7	9.7	9.7	9.3	111	750	113	26	17	13
26	10	9.4	9.6	9.6	9.8	9.5	139	570	103	25	18	13
27	9.7	8.9	9.6	9.6	9.8	9.6	149	450	98	24	16	13
28	9.3	8.8	9.6	9.5	9.8	9.6	166	470	92	24	16	12
29	9.1	8.8	9.4	9.6	9.8	9.8	199	483	86	22	16	12
30	9.0	9.0	9.5	9.2	---	9.5	186	509	81	23	16	12
31	8.9	---	9.4	9.0	---	9.5	---	541	---	22	16	---
TOTAL	254.3	275.4	299.7	295.1	285.6	300.5	2311.5	14757	9969	1342	545	473
MEAN	8.20	9.18	9.67	9.52	9.85	9.69	77.0	476	332	43.3	17.6	15.8
MAX	10	10	11	9.9	10	10	199	950	664	81	22	23
MIN	7.1	8.7	9.0	9.0	9.5	9.3	9.5	169	81	22	15	12
AC-FT	504	546	594	585	566	596	4580	29270	19770	2660	1080	938

CAL YR 1979	TOTAL	17998.2	MEAN	49.3	MAX	664	MIN	2.6	AC-FT	35700
WTR YR 1980	TOTAL	31108.1	MEAN	85.0	MAX	950	MIN	7.1	AC-FT	61700

1979 WY UNITED STATES DEPARTMENT OF INTERIOR - GEOLOGICAL SURVEY - WATER RESOURCES DIVISION

09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH PROCESS DATE: 07-JUN-85 15:36 PF
LAT 394628 LONG 1111125 STATE 49 COUNTY 007 DATUM OF GAGE: 7670.00 FT NGVD DRAINAGE AREA: 60.1

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.0	9.4	8.6	4.0	2.7	4.6	7.7	104	318	49	13	7.8
2	8.6	10	8.5	3.8	2.8	4.6	7.6	102	281	44	13	7.8
3	8.6	9.8	8.3	3.9	2.7	4.9	7.5	107	259	43	13	7.8
4	7.5	10	8.3	4.0	2.7	4.9	7.6	130	244	42	13	7.8
5	6.0	9.9	8.4	4.2	3.0	5.2	7.9	166	231	40	12	8.2
6	5.7	9.6	8.0	4.0	3.2	5.6	8.8	189	221	39	11	8.2
7	5.7	9.6	7.5	3.8	3.2	6.4	9.5	157	209	37	12	7.8
8	5.7	9.6	7.0	3.1	3.5	7.0	10	132	190	35	13	7.5
9	5.7	10	6.8	3.0	3.3	7.1	11	113	176	34	12	7.6
10	5.7	10	6.9	3.1	3.3	7.1	10	100	160	29	11	8.5
11	5.7	9.9	6.5	3.2	3.2	7.2	8.0	90	147	27	11	8.2
12	5.7	9.8	6.4	3.4	4.0	7.4	7.0	87	136	26	11	7.5
13	5.4	9.7	6.2	3.4	4.0	7.6	8.0	100	127	25	13	7.5
14	5.4	9.5	6.0	3.3	4.2	7.7	9.8	133	118	24	14	7.5
15	5.4	9.4	6.0	3.2	4.1	7.4	12	197	113	23	15	7.5
16	5.7	10	5.9	3.3	4.4	7.0	15	274	106	22	14	7.5
17	6.0	9.7	5.6	3.2	4.6	7.2	20	357	100	21	14	7.5
18	5.7	9.6	5.5	3.5	4.5	7.0	25	430	95	21	15	7.5
19	5.4	9.7	5.8	3.5	4.4	7.2	24	524	91	20	13	7.3
20	5.2	9.1	5.8	3.3	4.2	7.0	26	563	87	21	13	7.1
21	5.1	9.3	5.5	3.1	4.4	7.2	32	605	83	24	13	7.8
22	5.4	9.3	5.7	3.1	4.4	7.2	42	651	77	29	12	7.8
23	5.0	9.2	5.7	3.1	4.3	7.0	46	650	73	25	11	7.5
24	5.2	9.3	5.7	3.0	4.2	7.0	51	643	70	24	11	7.1
25	5.9	9.5	5.8	3.1	4.2	7.2	52	575	68	20	10	7.1
26	5.6	9.1	5.6	3.3	4.2	7.5	56	555	63	18	10	7.3
27	6.1	9.0	5.6	3.2	4.2	7.7	64	591	59	17	10	7.1
28	7.0	8.5	5.6	3.0	4.3	7.6	76	664	56	17	9.4	6.8
29	7.8	8.5	5.4	3.0	---	7.8	92	589	53	15	9.0	6.9
30	9.4	8.6	5.2	2.8	---	7.8	98	452	51	14	8.6	7.1
31	9.5	---	4.5	2.6	---	7.8	---	370	---	14	8.2	---
TOTAL	195.8	284.6	198.3	103.5	106.2	211.9	851.4	10400	4062	839	368.2	226.6
MEAN	6.32	9.49	6.40	3.34	3.79	6.84	28.4	335	135	27.1	11.9	7.55
MAX	9.5	10	8.6	4.2	4.6	7.8	98	664	318	49	15	8.5
MIN	5.0	8.5	4.5	2.6	2.7	4.6	7.0	87	51	14	8.2	6.8
AC-FT	388	565	393	205	211	420	1690	20630	8060	1660	730	449

CAL YR 1978	TOTAL	24053.5	MEAN	65.9	MAX	674	MIN	4.5	AC-FT	47710
WTR YR 1979	TOTAL	17847.5	MEAN	48.9	MAX	664	MIN	2.6	AC-FT	35400

Fish Creek
1932 - ~~1976~~
1984

STATION 09310500 FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

AGENCY: USGS
STATE: 49
COUNTY: 007
DISTRICT: 49

STATION LOCATION
LAT. 394629 LONG. 1111125

DRAINAGE AREA: 60.10 SQ MI
CONTRIBUTING DRAINAGE AREA: SQ MI
GAGE DATUM: 7570.00 (NGVD)
BASE DISCHARGE: 270.00 CFS

WATER YEAR	Date Rank	DATE	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	GAGE HT CODES	NUMBER OF PARTIAL PEAKS
1932	139	05/19/32	673.00		3.77	3	6				0
1933	153	06/02/33			4.10	3					0
1939	120	04/30/39	261.00		2.29	3	6				0
1940	133	05/13/40	520.00		3.00	3					0
1941	133	05/13/41	645.00		3.11	3					0
1942	146	05/26/42	629.00		3.10	3					0
1943	152	06/01/43	342.00		2.43	3					0
1944	135	05/15/44	577.00		3.00	3					0
1945	131	05/11/45	629.00		3.08	3					0
1946	116	04/26/46	412.00		2.48	3					0
1947	125	05/04/47	622.00		3.08	3					0
1948	137	05/17/48	414.00		2.55	3					0
1949	137	05/17/49	594.00		2.94	3					0
1950	143	05/23/50	463.00		2.66	3					0
1951	140	05/20/51	433.00		2.37	3					0
1952	134	05/14/52	1070.00		3.62	3					0
1953	148	05/28/53	492.00		2.52	3					0
1954	128	05/08/54	213.00		1.53	3					0
1955	132	05/12/55	448.00		2.48	3					0
1956	126	05/06/56	448.00		2.45	3					0
1957	155	06/04/57	818.00		3.65	3					0
1958	145	05/23/58	868.00		3.63	3					0
1959	134	05/14/59	221.00		1.98	3	6				0
1960	133	05/13/60	479.00		2.86	3					0
1961	132	05/12/61	122.00		1.43	3					0
1962	127	05/07/62	660.00	1							0
1963	139	05/19/63	382.00		2.64	3					0
1964	143	05/23/64	710.00		3.54	3					0
1965	141	05/21/65	717.00		3.58	3					1
	~~151~~	05/31/65	479.00		2.83	3					0
1966	130	05/10/66	295.00		2.08	3					0
1967	141	05/27/67	744.00		3.68	3	6				1
1968	150	05/30/68	756.00		4.60	3					
	~~145~~	05/22/68	480.00		3.89	3					0
1969	134	05/14/69	752.00		4.55	3					0
1970	139	05/19/70	639.00		4.20	3					0
1971	135	05/15/71	659.00		3.93	3					0
1972	128	05/08/72	229.00		2.78	3					0
1973	140	05/20/73	1160.00		4.87	3					0
1974	129	05/09/74	874.00		4.35	3					1
1975	122	06/05/75	1030.00		4.87	3					
	~~[illegible]~~	05/20/75	579.00		3.76	3					0
1976	139	05/14/76	457.00		3.51	3					0
1977	107	04/17/77	74.00	1				2.76	04/11/77	1	1
1978	143	05/23/78	729.00		4.12	3					
	~~134~~	05/16/78	617.00		3.87	3					

1979	05/20/79	715.00		4.87	0
1980	05/23/80	997.00		4.5[illegible]	1
	06/06/80	754.00		4.11	
1981	05/03/81	282.00		2.90	0
1982	05/27/82	615.00	1		0
1983	05/30/83	1310.00		3.41	1
	06/11/83	1230.00		3.7[illegible]	
1984	05/21/84	1450.00		4.20	0

Total $\frac{5696}{42} = 135.6 = 5/16/86$

143
140
132
126
134

675

$\frac{675}{5} = 135$ [illegible] 5/16/86

STATION NUMBER 09310500

LOWEST YEAR VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

DISCHARGE-(CFS)
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1	3	7	14	30	60	90	120	183
1940	5.00 10	5.00 12	5.00 6	5.00 13	7.00 19	7.50 19	7.80 20	8.40 22	8.20 14
1941	5.00 11	5.00 13	5.30 14	5.60 14	6.00 14	6.50 13	6.70 12	6.80 9	7.10 8
1942	10.00 41	10.00 40	10.00 40	10.00 41	10.00 39	11.00 40	11.00 39	12.00 40	14.00 40
1943	6.00 21	6.30 21	7.00 25	7.00 22	7.40 24	8.00 26	8.10 23	8.70 28	9.00 22
1944	7.00 27	7.70 32	7.90 32	7.90 30	8.00 30	8.00 27	8.30 26	8.60 26	9.30 23
1945	7.00 28	7.00 27	7.00 26	7.00 23	7.00 20	7.00 15	7.30 13	7.70 14	8.60 18
1946	8.00 35	8.00 34	8.00 33	8.00 31	8.00 31	8.20 31	8.40 29	8.70 27	10.00 30
1947	5.40 18	5.50 17	5.60 15	5.80 15	6.30 15	7.80 23	8.10 24	8.30 20	8.40 17
1948	6.50 24	6.50 23	6.50 21	6.50 19	6.80 16	7.10 16	7.50 15	7.90 17	8.80 20
1949	5.10 15	5.10 14	5.20 12	5.30 10	5.80 11	6.80 14	7.60 18	8.10 18	8.20 15
1950	8.00 36	8.00 35	8.00 34	8.00 32	8.00 32	8.00 28	8.30 27	8.50 23	9.60 28
1951	4.00 6	4.00 6	4.20 5	5.00 8	5.60 9	5.80 8	6.20 9	6.70 8	8.10 13
1952	7.60 32	7.60 31	7.70 31	8.00 33	8.00 33	8.00 29	8.00 21	8.30 21	9.40 26
1953	11.00 44	11.00 43	11.00 43	11.00 43	11.00 41	12.00 41	13.00 41	14.00 43	14.00 41
1954	8.00 37	8.70 37	9.00 37	9.00 37	9.00 36	9.30 36	9.50 34	9.70 33	10.00 31
1955	5.30 16	5.50 15	5.80 16	6.10 18	7.10 21	8.00 30	8.10 22	8.50 24	8.40 16
1956	6.30 22	6.50 24	6.80 23	7.30 27	7.40 25	7.50 20	7.70 19	7.80 15	8.00 11
1957	6.00 19	6.00 19	6.00 18	6.00 16	6.00 12	6.20 11	6.40 10	7.00 10	7.20 9
1958	6.00 20	6.00 20	6.00 19	6.00 17	6.00 13	6.20 12	6.50 11	7.00 11	9.30 24
1959	7.00 29	7.00 28	7.00 24	7.00 24	7.20 22	7.30 17	7.50 16	7.60 13	8.00 12
1960	4.40 8	4.60 8	5.20 13	5.30 11	5.70 10	6.00 9	6.10 7	6.50 7	6.70 6
1961	3.10 3	3.30 3	3.60 3	4.30 4	4.90 4	5.50 7	6.20 8	7.20 12	7.40 10
1962	3.20 4	3.40 4	3.70 4	4.20 3	4.70 3	5.10 5	5.50 5	5.80 5	6.00 2
1963	4.00 7	4.00 5	4.30 6	4.60 5	5.10 7	6.20 10	7.40 14	7.80 16	8.70 19
1964	5.00 12	5.00 9	5.00 9	5.00 6	5.00 5	5.00 3	5.00 3	5.30 3	6.20 4
1965	5.00 13	5.00 10	5.00 10	5.00 7	5.00 6	5.10 4	5.20 4	5.40 4	6.60 5
1966	7.00 30	7.00 29	7.50 30	7.80 29	7.90 29	7.90 24	8.50 30	10.00 34	12.00 37
1967	5.00 14	5.00 11	5.20 11	5.60 12	7.00 17	9.00 33	9.10 32	9.30 31	9.40 27
1968	7.90 34	8.20 36	8.60 36	8.70 35	8.80 34	9.10 34	9.40 33	9.70 32	10.00 32
1969	7.40 31	7.40 30	7.40 29	7.40 28	7.40 26	7.40 18	7.60 17	8.20 19	10.00 33
1970	8.60 39	10.00 41	10.00 41	10.00 42	10.00 39	10.00 37	10.00 38	10.00 35	12.00 38
1971	6.60 25	6.90 25	7.20 28	9.00 36	12.00 42	13.00 42	13.00 42	13.00 41	15.00 43
1972	7.80 33	7.90 33	8.10 35	8.50 34	9.00 35	9.20 35	9.90 36	11.00 37	11.00 34
1973	3.60 5	5.50 16	6.10 20	7.20 26	7.80 27	8.70 32	9.70 35	11.00 38	11.00 35
1974	8.40 38	8.80 39	9.20 38	9.50 39	10.00 40	10.00 38	10.00 37	10.00 36	11.00 36
1975	6.30 23	6.40 22	6.60 22	6.80 21	7.00 18	7.60 21	8.60 31	9.20 30	9.30 25
1976	10.00 42	10.00 42	10.00 42	10.00 40	12.00 43	14.00 43	14.00 43	14.00 42	14.00 42
1977	4.50 9	4.50 7	4.50 7	5.10 [illegible]	5.40 [illegible]	5.30 6	5.60 6	5.00 6	6.80 7
1978	3.00 2	3.10 2	3.20 2	3.40 2	3.50 [illegible]	3.60 2	4.30 1	4.60 1	5.60 1

STATION NUMBER 09310500

LOWEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING MARCH 31

DISCHARGE-(CFS)
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1	3	7	14	30	60	90	120	183
1979	2.60 1	2.70 1	2.80 1	2.90 1	3.10 1	3.60 1	4.30 2	5.10 2	6.10 3
1980	6.80 26	6.90 26	7.10 27	7.10 25	7.30 23	7.80 22	8.30 28	8.60 25	9.00 21
1981	8.90 40	9.00 39	9.20 39	9.30 38	9.60 37	11.00 39	12.00 40	12.00 39	13.00 39
1982	5.40 17	5.60 18	5.90 17	6.70 20	7.80 28	8.00 25	8.20 25	8.80 29	9.90 29
1983	11.00 43	12.00 44	13.00 44	14.00 44	15.00 44	15.00 44	16.00 44	17.00 44	21.00 45
1984	13.00 45	13.00 45	14.00 45	15.00 45	18.00 45	19.00 45	19.00 45	19.00 45	20.00 44

STATION NUMBER 09310000

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING SEPTEMBER 30

DISCHARGE-(CFS)
MEAN
FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1	3	7	15	30	60	90	120	183
1939	242.00 40	238.00 40	230.00 40	202.00 40	166.00 40	119.00 41	91.00 41	72.00 41	50.00 42
1940	480.00 27	473.00 26	438.00 25	395.00 24	258.00 26	191.00 28	136.00 29	106.00 29	72.00 30
1941	598.00 19	565.00 20	526.00 19	477.00 14	386.00 13	269.00 15	186.00 14	145.00 16	100.00 15
1942	593.00 20	566.00 19	522.00 20	412.00 22	326.00 22	239.00 19	185.00 16	148.00 14	102.00 14
1943	241.00 41	240.00 39	236.00 39	220.00 39	177.00 39	154.00 33	121.00 33	98.00 32	69.00 32
1944	522.00 25	499.00 24	460.00 24	434.00 21	392.00 11	261.00 14	186.00 15	145.00 15	99.00 16
1945	554.00 23	537.00 21	480.00 23	411.00 23	319.00 24	224.00 23	170.00 20	135.00 20	93.00 19
1946	384.00 34	371.00 33	353.00 33	313.00 32	248.00 32	166.00 32	122.00 32	96.00 33	67.00 35
1947	540.00 24	535.00 23	496.00 22	392.00 25	291.00 25	196.00 25	147.00 25	117.00 25	83.00 25
1948	382.00 35	369.00 36	340.00 34	271.00 36	207.00 36	136.00 38	101.00 38	80.00 38	55.00 39
1949	496.00 26	462.00 27	417.00 26	376.00 26	327.00 21	244.00 17	181.00 17	142.00 17	98.00 17
1950	432.00 29	428.00 28	405.00 27	364.00 27	273.00 29	190.00 29	144.00 26	114.00 26	79.00 26
1951	399.00 32	375.00 32	368.00 31	332.00 29	275.00 28	194.00 26	150.00 24	120.00 24	84.00 24
1952	940.00 5	902.00 4	799.00 5	728.00 4	721.00 3	536.00 1	390.00 1	303.00 1	205.00 1
1953	448.00 28	404.00 30	369.00 30	325.00 31	265.00 30	175.00 31	132.00 30	106.00 30	75.00 29
1954	198.00 43	198.00 43	188.00 43	163.00 42	150.00 42	107.00 43	80.00 43	64.00 43	45.00 43
1955	371.00 36	370.00 34	328.00 36	280.00 34	229.00 34	153.00 34	113.00 34	90.00 34	63.00 34
1956	392.00 33	382.00 31	356.00 32	289.00 33	251.00 31	178.00 30	131.00 31	103.00 31	71.00 31
1957	736.00 9	731.00 8	692.00 8	568.00 10	401.00 10	288.00 10	211.00 10	167.00 10	115.00 11
1958	776.00 7	759.00 7	726.00 7	610.00 7	452.00 9	284.00 11	205.00 12	159.00 12	108.00 13
1959	197.00 44	193.00 44	173.00 44	142.00 44	113.00 44	81.00 44	60.00 44	48.00 44	34.00 44
1960	406.00 31	370.00 35	334.00 35	271.00 37	199.00 37	129.00 39	99.00 39	79.00 39	56.00 38
1961	109.00 45	102.00 45	89.00 45	80.00 45	59.00 45	50.00 45	38.00 45	30.00 45	22.00 45
1962	660.00 13	640.00 13	600.00 13	477.00 15	335.00 14	299.00 9	223.00 9	175.00 7	119.00 8
1963	341.00 37	337.00 37	323.00 37	277.00 35	221.00 35	141.00 36	103.00 37	82.00 37	58.00 37
1964	602.00 18	598.00 18	556.00 16	452.00 20	320.00 23	194.00 27	139.00 28	109.00 28	76.00 28
1965	655.00 15	617.00 15	539.00 18	454.00 19	386.00 12	263.00 13	195.00 13	155.00 13	109.00 12
1966	284.00 38	267.00 38	256.00 38	230.00 38	185.00 33	137.00 37	105.00 35	84.00 35	60.00 35
1967	669.00 11	637.00 14	604.00 12	506.00 12	368.00 17	232.00 21	166.00 21	131.00 21	91.00 21
1968	623.00 16	601.00 17	555.00 17	461.00 17	363.00 18	246.00 16	177.00 18	138.00 18	97.00 18
1969	660.00 14	645.00 12	632.00 9	574.00 9	460.00 8	304.00 8	224.00 8	177.00 6	122.00 6
1970	564.00 22	536.00 22	511.00 21	460.00 18	334.00 19	223.00 22	161.00 22	127.00 22	88.00 23
1971	567.00 21	498.00 25	404.00 28	331.00 30	283.00 27	205.00 23	158.00 23	126.00 23	90.00 22
1972	219.00 42	215.00 42	205.00 41	193.00 41	163.00 41	119.00 40	92.00 40	76.00 40	54.00 40
1973	1050.00 3	1010.00 3	907.00 3	739.00 3	518.00 5	319.00 5	226.00 6	174.00 8	119.00 7
1974	749.00 8	679.00 9	595.00 14	472.00 16	329.00 20	201.00 24	143.00 27	112.00 27	77.00 27
1975	907.00 6	870.00 6	820.00 4	663.00 5	491.00 6	317.00 6	224.00 7	173.00 9	118.00 9
1976	430.00 30	410.00 29	394.00 27	333.00 31	235.00 33	140.00 35	103.00 36	82.00 36	59.00 36
1977	74.00 46	58.00 46	51.00 46	42.00 46	33.00 46	28.00 46	23.00 46	19.00 46	14.00 46

STATION NUMBER 09310500

HIGHEST MEAN VALUE AND RANKING FOR THE FOLLOWING NUMBER OF CONSECUTIVE DAYS IN YEAR ENDING SEPTEMBER 30

DISCHARGE-(CFS)
MEAN

FISH CREEK ABOVE RESERVOIR NEAR SCOFIELD, UTAH

YEAR	1		3		7		15		30		60		90		120		183	
1978	674.00	10	649.00	10	623.00	10	591.00	8	457.00	7	315.00	7	229.00	5	180.00	5	123.00	5
1979	664.00	12	648.00	11	618.00	11	548.00	11	370.00	16	242.00	18	174.00	19	135.00	19	92.00	20
1980	950.00	4	887.00	5	740.00	6	620.00	6	504.00	4	417.00	4	306.00	4	237.00	4	161.00	4
1981	250.00	39	219.00	41	190.00	42	160.00	43	127.00	43	113.00	42	88.00	42	71.00	42	51.00	41
1982	615.00	17	602.00	16	574.00	15	484.00	13	372.00	15	283.00	12	210.00	11	166.00	11	115.00	10
1983	1220.00	2	1140.00	2	1070.00	2	1020.00	2	854.00	1	532.00	2	383.00	2	299.00	2	205.00	2
1984	1310.00	1	1270.00	1	1190.00	1	1030.00	1	824.00	2	515.00	3	368.00	3	287.00	3	196.00	3

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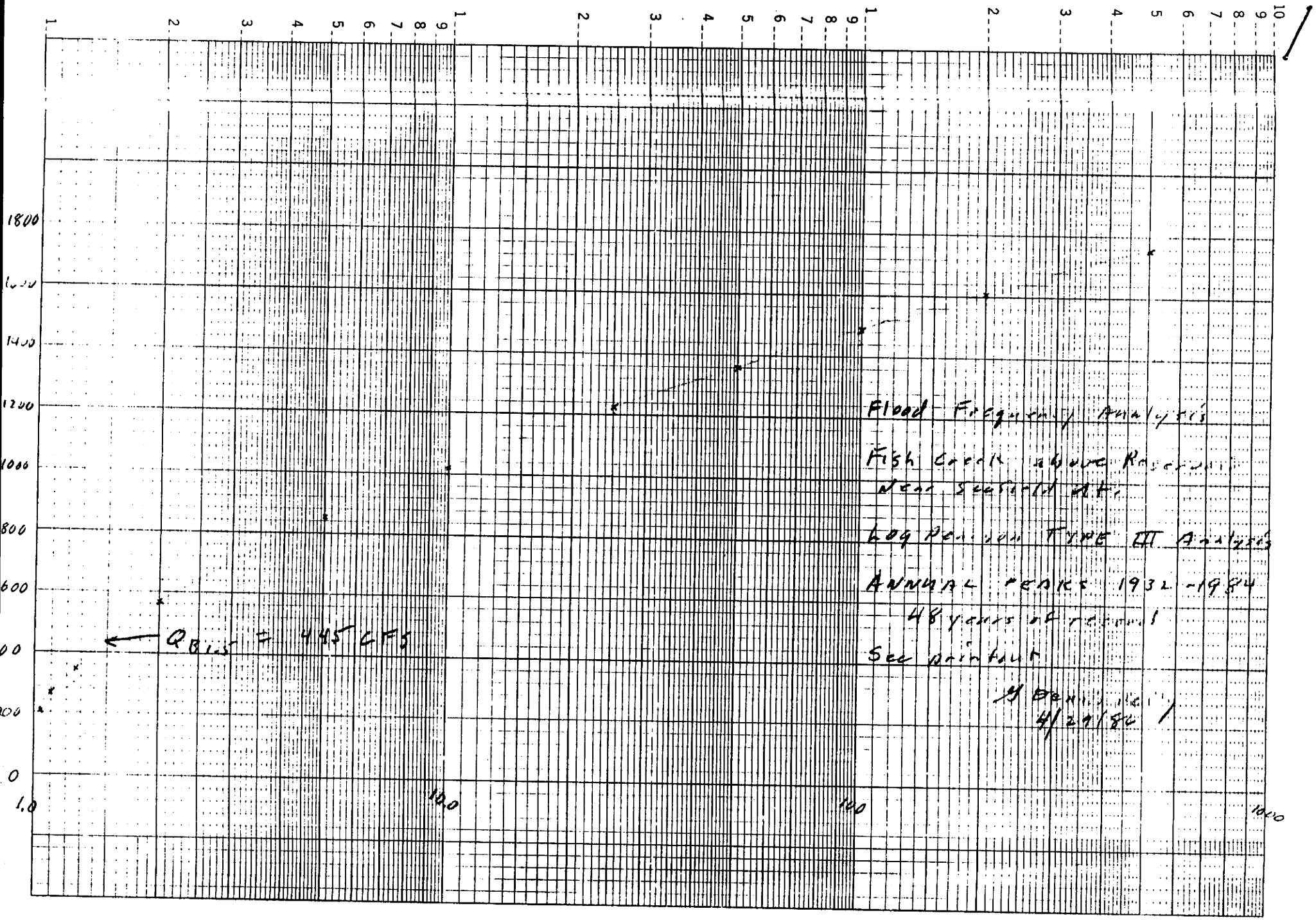
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 5490



October 1992

U.S. FOREST SERVICE
MANTI LA SAL FOREST
DENNIS KELLY DATA FILES

WINTER QUARTERS CANYON CREEK

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SELECTED HYDROLOGIC DATA, PRICE RIVER BASIN, UTAH, WATER YEARS 1979 AND 1980

by K. M. Waddell, J. E. Dodge, D. W. Darby, and S. M. Theobald

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U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 82-916

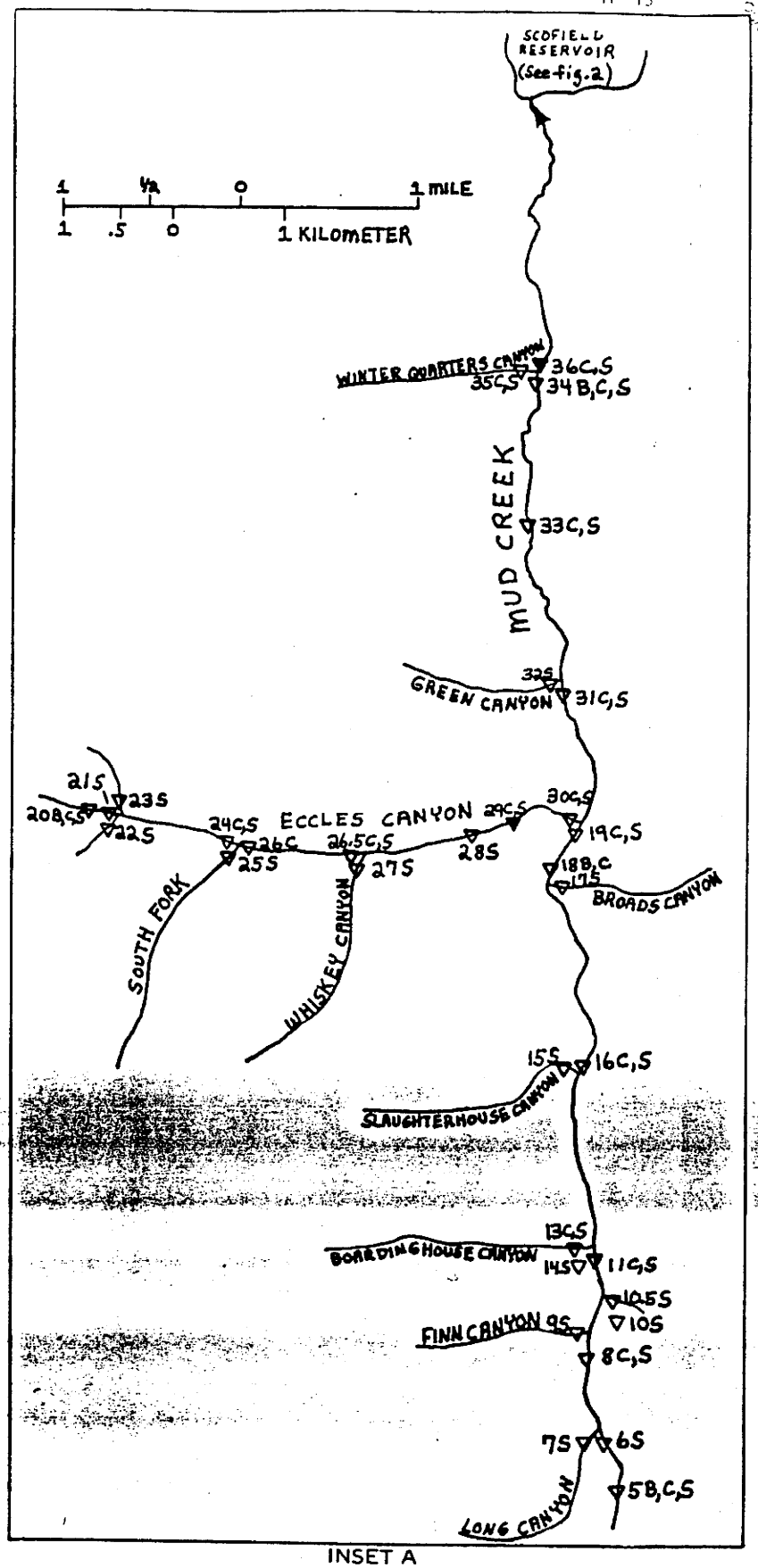
Prepared in cooperation with the

U.S. BUREAU OF LAND MANAGEMENT

Salt Lake City, Utah
1982

Table 10.--Discharge and specific conductance of water at seepage study sites--Continued

Stream	Site No. (see pl. 1)	Date	Discharge (ft^3/s)	Specific conductance (µmho/cm at 25°C)
		Mud Creek basin--Continued		
Whiskey Canyon	27	10-11-79	0.53	--
		9- 5-80	.25	--
Eccles Canyon	28	10-11-79	.93	320
		9- 5-80	1.7	495
	30	10-11-79	1.0	475
		9- 5-80	2.1	490
Mud Creek	31	10-12-79	2.5	495
		9- 5-80	4.1	510
Green Canyon	32	10-12-79	.02	490
		9- 5-80	0	--
Mud Creek	33	10-12-79	2.4	--
		9- 5-80	4.7	500
	34	10-12-79	2.7	500
		9- 5-80	4.6	475
Winter Quarters Canyon	35	10-12-79	.30	580
		9- 5-80	.51	600
		Soldier Creek drainage basin		
Soldier Creek	38	10-10-79	.20	880
		9- 4-80	.57	910
	39	10-10-79	.20	800
		9- 4-80	.61	870
Unnamed	40	10-10-79	.18	830
		9- 4-80	.27	720
	41	10-10-79	.01	700
		9- 5-80	.04	610
Soldier Creek	42	10-10-79	.43	830
		9- 5-80	.92	800
Pine Canyon	43	10-10-79	.02	590
		9- 4-80	.03	580
	44	10-10-79	.01	540
		9- 4-80	.04	480
Unnamed	45	10-10-79	.02	530
		9- 4-80	.03	510
Pine Canyon	46	10-10-79	.02	530
		9- 4-80	.05	435
		10-11-80	.07	500

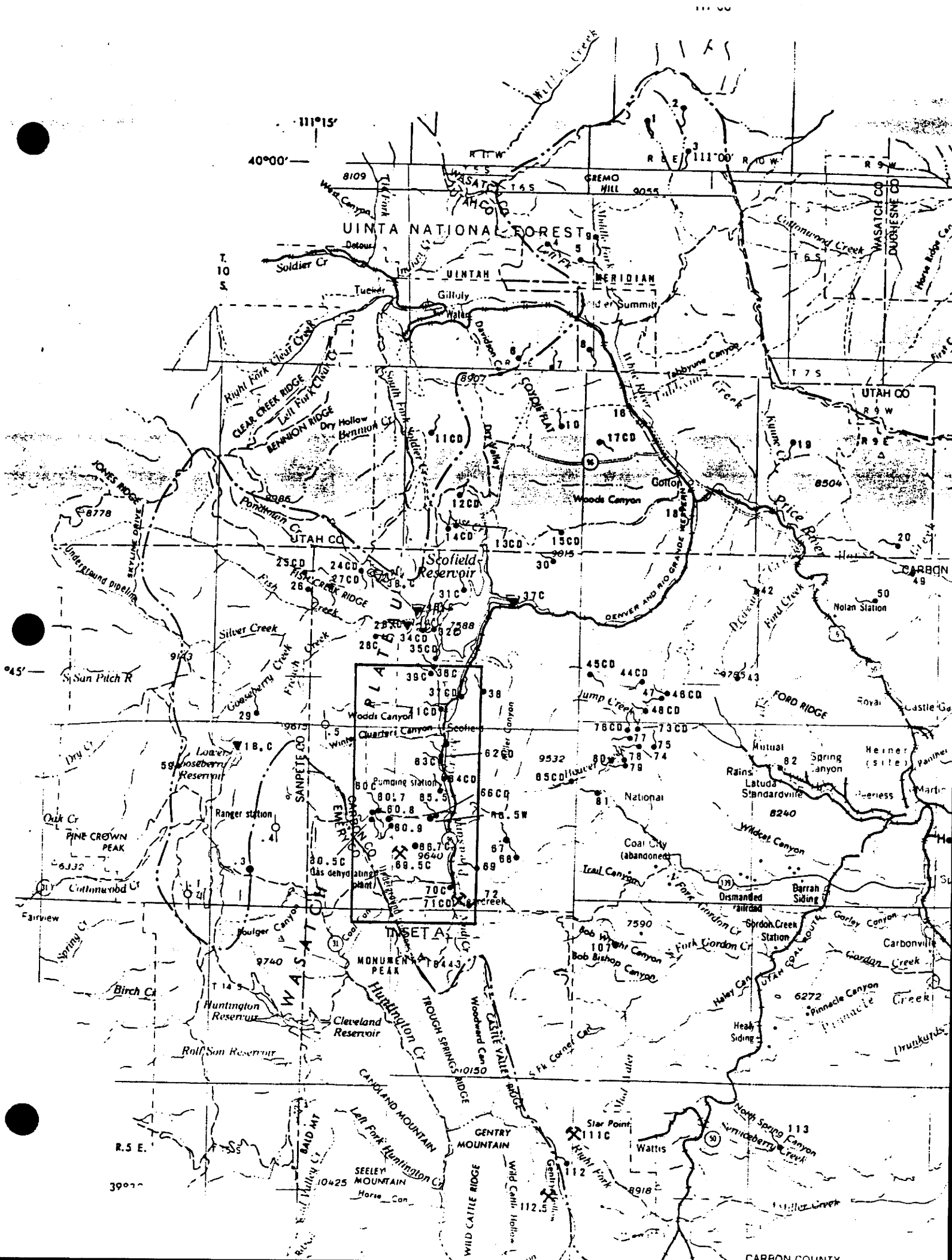


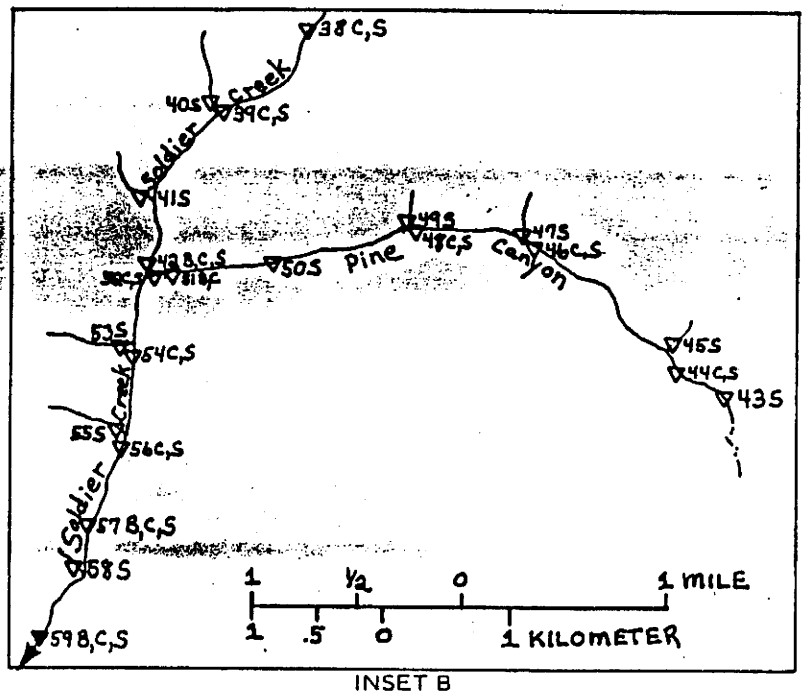
INSET A

Surface-water sites Scofield Reservoir area

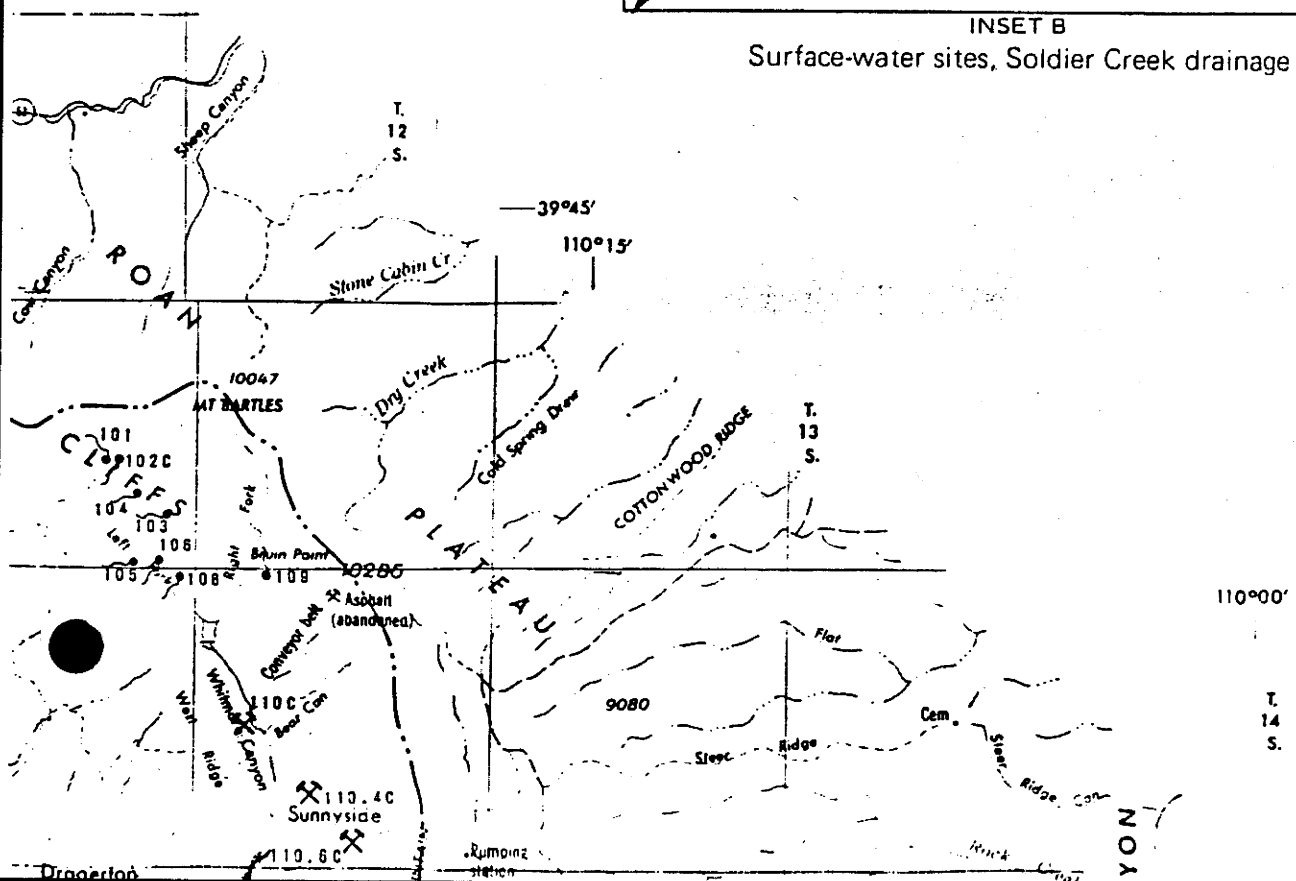
Base from U. S. Geological Survey 1:250,000 series Price, Utah (1956) and Salt Lake City, Utah (1954)

MAP SHOWING


111°15'
40°00'
111°00'
UINTA NATIONAL FOREST
WASATCH CO
UTAH CO
DUCHESNE CO
CARBON CO
EMERY CO
SANPETE CO
UINTAH
SALT LAKE
WASATCH
GREMO HILL 9055
Soldier Cr
Tucker
Gilluly
Summit
Scofield Reservoir
Gordon
Woods Canyon
Price River
Nolan Station
Mutual
Spring Canyon
Latuda
Standardville
National
Coal City (abandoned)
Barrah Siding
Dismantled railroad
Gordon Creek Station
Carbonville
Star Point
Wattis
Huntington Reservoir
Cleveland Reservoir
Rolfson Reservoir
Ranger station
Gas dehydrating plant
Pumping station
Lower Gooseberry Reservoir
PINE CROWN PEAK
MONUMENT PEAK
GENTRY MOUNTAIN
SEELEY MOUNTAIN
CANDLAND MOUNTAIN
TROUGH SPRINGS RIDGE
CASTLE VALLEY RIDGE
WILD CATTLE RIDGE
CLEAR CREEK RIDGE
BENNION RIDGE
JONES RIDGE
FISH CREEK RIDGE
FORD RIDGE
SOYOE FLAT
DENVER AND RIO GRANDE WESTERN
UTAH COAL ROUTE
INSET A
R.5 E.
T. 10 S.
T 14 S
R 9 E
R 9 W
R 10 W
R 11 W



INSET B
Surface-water sites, Soldier Creek drainage



WINTER QUARTERS CREEK

Sec 2 T 13S R 4E

Price River

Sub W/S 408

Winter Quarters Canyon

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

Meas. No. _____

Comp. by _____

Checked by _____

DISCHARGE MEASUREMENT NOTES

Sta. No. _____

Station Name Winter Quarters Canyon Creek at N.F. Bndry.

Date 9-11-, 1986 Party Kelly / Mills

Width _____ Area _____ Vel. _____ G. H. _____ Disch. _____

Method _____ No. secs. _____ G. H. change _____ in _____ hrs. Susp. _____

Method coef. _____ Hor. angle coef. _____ Susp. coef. _____ Meter No. _____

GAGE READINGS				
Time		Recorder	Inside	Outside
Weighted M. G. H.				
G. H. correction				
Correct M. G. H.				

Date rated _____ Used rating for rod _____ susp. Meter _____ ft. above bottom of wt. Tags checked _____

Spin before meas. _____ after _____

Meas. plots _____ % diff. from _____ rating

Wading, cable, ice, boat, upstr., downstr., side bridge _____ feet, mile, above, below gage, and _____

Check-bar, chain found _____ changed to _____ at _____

Correct _____

Levels obtained _____

Measurement rated excellent (2%), good (5%), fair (8%), poor (over 8%), based on following conditions: Cross section _____

Flow _____ Weather _____

Other _____ Air _____ °F@ _____

Gage _____ Water _____ °F@ _____

_____ Record removed _____ Intake flushed U L _____

Observer _____

Control _____

Remarks Gurley pygmy meter

G. H. of zero flow _____ ft.

GPO : 1978 O - 268-758

2500-4(12/77)

River at—

Angle coefficient	Dist. from initial point	Width	Depth	Observation depth	Revolutions	Time in seconds	VELOCITY At point	VELOCITY Mean in vertical	Adjusted for hor. angle or ———	Area FT²	Discharge CFS
	1.3	[illegible]	Edge								
	1.5	[illegible]	0.01				0.032				0
	2.0	[illegible]	0.22	.11	[illegible]	[illegible]	0.161			0.110	0.018
	2.5	[illegible]	[illegible]	.10	[illegible]	60	0.750			0.100	0.075
	3.0	[illegible]	0.32	.16	57	75	0.760			0.160	0.122
	3.5	[illegible]	0.26	.13	29	60	0.483			0.130	0.063
	4.0	[illegible]	0.44	.22	39	60	0.650			0.220	0.143
	4.5	0.5	0.40	.20	69	60	1.150			0.200	0.230
	5.0	0.5	0.42	.21	15	64	0.234			0.210	0.049
	5.5	0.5	0.41	.20	29	62	0.468			0.205	0.096
	6.0	0.75	0.34	.17	20	60	0.333			0.170	0.057
	6.5	1.50	Edge								
⊙										1.509	0.853

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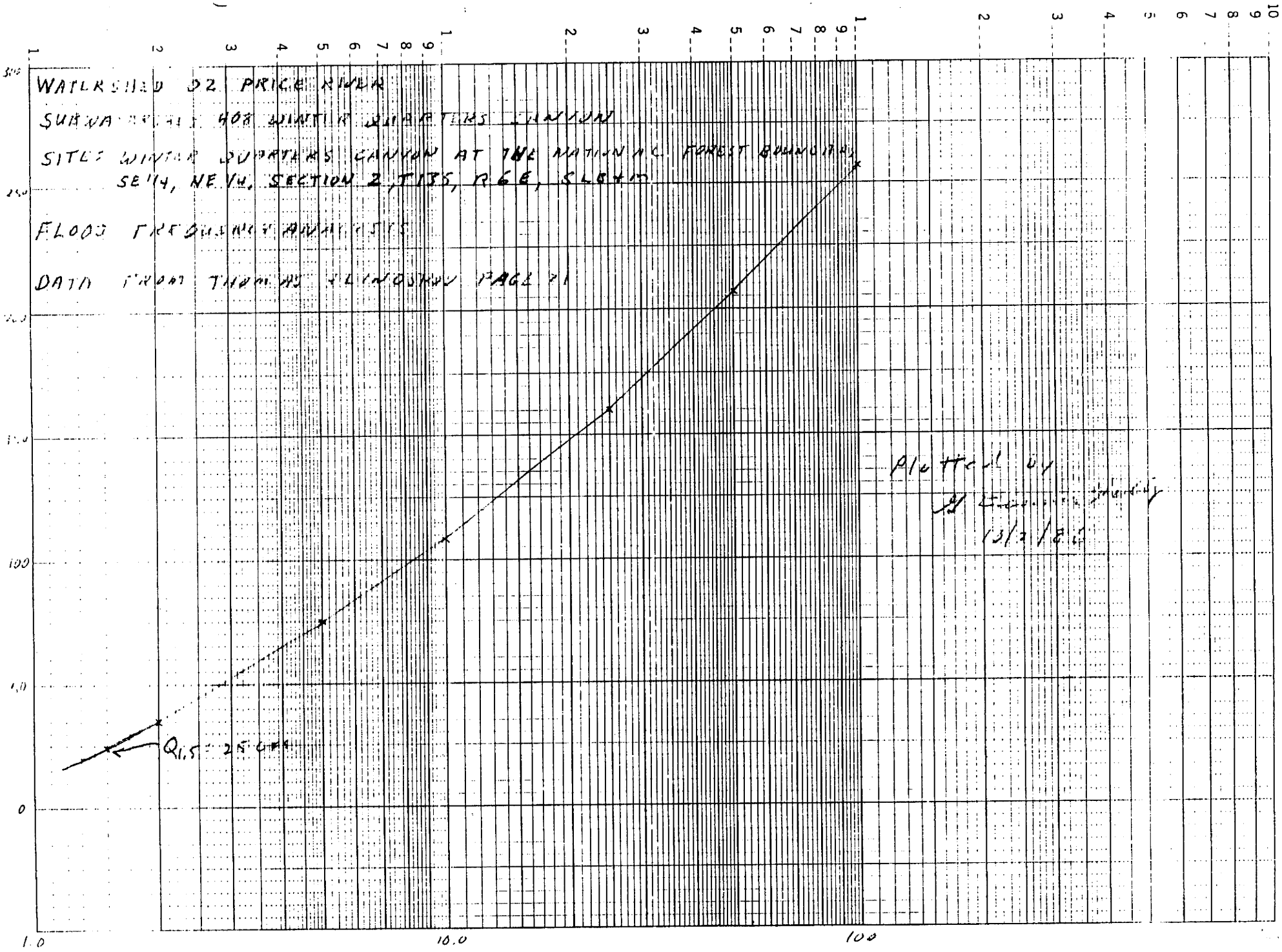


DATA SHEET

WATERSHED: 002 PRICE RIVER

DATE: 10/2/84

SUBWATERSHED: 408 WINTER QUARTERS CANYON

AUTHOR: [illegible]

SITE: AT THE NATIONAL FOREST BOUNDARY
SE 1/4, NE 1/4, SECTION 2, T13S, R6E, SLB&M

Determine Qs from Thomas + Hudson page 21

A = 2789 Acres = 4.36 mi²

E = 9.12 Thousands of ft (msl)

```
*

* LIST
00050 let A=4.36
00060 let E=9.12
00100 let Q=10.8*A^.8
00110 print "RT=2   Q=";Q
00200 let Q=25.1*A^.74
00210 print "RT = 5   Q=";Q
00300 let Q=680*A^.706*E^(-1.3)
00310 print "RT = 10   Q=";Q
00400 let Q=10300*A^.672*E^(-2.33)
00410 print "RT = 25   Q =";Q
00500 let Q=64200*A^.651*E^(-3.03)
00510 print "RT = 50   Q =";Q
00600 let Q=347000*A^.631*E^(-3.68)
00610 print "RT = 100   Q =";Q
01120 end
*

* RUN
RT=2   Q= 35.0762
RT = 5   Q= 74.6266
RT = 10   Q= 108.641
RT = 25   Q = 160.615
RT = 50   Q = 206.565
RT = 100   Q = 257.671
```

$Q_{1.5}$ = 25 cfs

```
END at 01120
*
```

DATA SHEET

WATERSHED: 002 PRICE RIVER

DATE:

SUBWATERSHED: 408 WINTER QUARTERS CANYON

AUTHOR:

SITE: AT THE NATIONAL FOREST BOUNDARY
SE 1/4, NE 1/4, SECTION 2, T13S, R6E, SLB&M

Determine Q_B from channel cross section data

$Q = AV$

$A = 3.339\ ft^2$ Interpolated from R4CROSS 2.2 Item 4

$V = \frac{1.48}{n} R^{2/3} S^{1/2}$

$S = 0.0219\ ft/ft$ measured in the field

$R = \frac{A}{WP}$

$WP = 10\ ft.$ measured from graphical x-section data.

$n = 0.180487$ from R4CROSS 2.2 Item 1

```
*

* LIST
00100 let A=3.339
00110 let N=.180487
00120 let S=.0219
00130 let WP=10
00140 let R=A/WP
00150 print "R=";R
00160 let Y=2/3
00170 let V=R^Y*S^.5*1.48/N
00180 print "V=";V;"FT/SEC"
00190 let Q=A*V
00200 print "Q=";Q;"CFS"
00210 end
* RUN
R= .3339
V= .584048 FT/SEC
Q= 1.95014 CFS

END at 00210
*
```

CROSS SECTION AND DISCHARGE NOTES

Tape-Length _____ Wt. _____ #/Ft
Stakes @ = Elev.? /Yes/or/No/

Dist. From Left	VERTICAL DEPTH To Grd.	VERTICAL DEPTH Of Water	CURRENT VELOCITY Revs.	CURRENT VELOCITY Time	CURRENT VELOCITY Ft/Sec
0.0	0.1				
0.5	1.27				
1.0	1.70	QB			
1.3	1.92	1/2 Edge			
1.5	1.97				
2.0	2.18	Thalweg			
2.5	2.15				
3.0	2.25				
3.5	2.19				
4.0	2.40				
4.5	2.45				
5.0	2.43				
5.5	2.49				
6.0	2.18	Thalweg			
6.5	1.95	1/2 Edge			
7.0	1.80				
7.5	1.72	QB			
8.0	1.82				
8.5	1.86				
9.0	1.81				
9.5	1.89				
10.0	1.86				
10.5	1.74				
11.0	1.08				
11.5	0.40				
12.0	0.10				
13	0.0				

Notes Continued

Tape Dist. From Left* Stake	VERTICAL DEPTH To Grd.	VERTICAL DEPTH Of Water	CURRENT VELOCITY Revs.	CURRENT VELOCITY Time	CURRENT VELOCITY Ft/Sec

Ave. Depth.... _____ Velocity.. _____
Width _____ Ft., Discharge _____ c.f.s.

Observations and Remarks: Winter Quarters Canyon Creek w/s 00?
at N.F. Boundary 9-11-86
SE 1/4, NE 1/4, Sec 2, T13S R6E, SLB&M.

Note: Use one star(*) in the left margin to indicate PRESENT W[illegible] INE, **for NORMAL HIGH WATER or "Grass" LINE & *** for EXTREM[illegible]

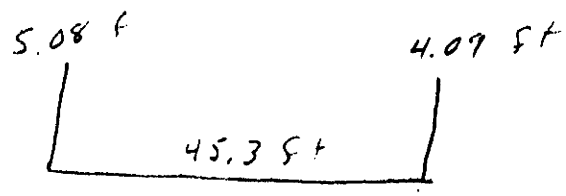
Signature: Kelly / Mills

Pa[illegible] of ___.

Distance = 45.3 ft

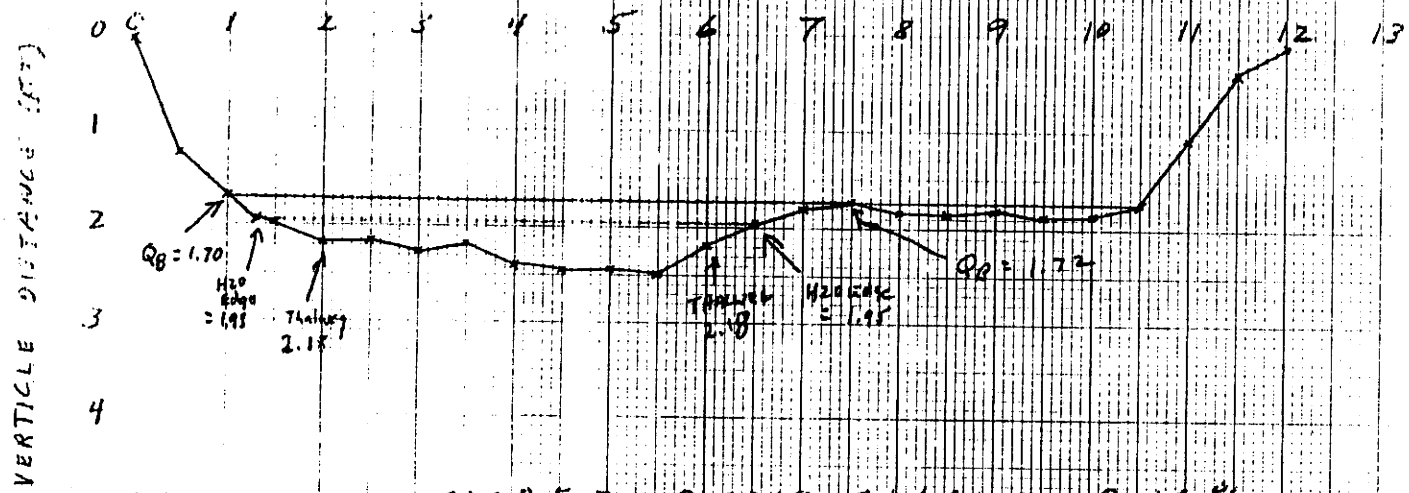
[illegible] 5.08 ft.

[illegible] 4.09 ft.



$$\frac{5.08 - 4.09}{45.3} \times 100 = 2.19\% = 0.0219 \text{ ft/ft}$$

WATERSHED 02 PRICE RIVER
SUB WATERSHED 408 WINTER QUARTERS CANYON
SITE: AT THE NATIONAL FOREST BOUNDARY
SE¼ NW¼, SECTION 2 T13S, R6E, SLB&M
DATA COLLECTED 9/11/86



SLOPE = 0.0219 FT/FT = 2.19 %
Q on 9/11/86 = 0.853 CFS

9/12/86
MPK

CROSS SECTION DATA FOR WINTER QUARTERS CANYON

DISTANCE	WATER DEPTH	INCREMENTAL AREA
1	0	0
2	.230001	7.50005E-02
3	.3	.311001
4	.45	.626001
5	.480001	1.11
6	.230001	1.545
7	0	1.591
8	0	1.591
9	0	1.591
10	0	1.591
11	0	1.591
12	0	1.591

MEAN DEPTH = .305961

MANNINGS N = .180487
WETTED PERIMETER = 5.44614

Watershed 02 Price River
Subwatershed #408 Winter Quarters Canyon
Site: At The National Forest Boundary
SE 1/4, NE 1/4, Sec.2, T. 13 S., R. 6 E., SLB&M.
Data collected: 9/11/86
Run date: 9/15/86 Checked:mjw 9/15/86
Item#1
"R4CROSS2.2"

Watershed 02 Price River Subwatershed #408 Winter Quarters Canyon

dist. below tape (sq.ft.) ELEVATION	AREA (sq.ft.)	(ft.) MEAN DEPTH	(ft.) TOP WIDTH	(ft.) MAXIMUM DEPTH
0	21.882	1.76467	12.4	2.49
.1	20.662	1.7076	12.1	2.39
.2	19.476	1.6505	11.8	2.29
.3	18.306	1.5781	11.6	2.19
.4	17.1586	1.51846	11.3	2.09
.5	16.0286	1.41846	11.3	1.99
.6	14.9082	1.34308	11.1	1.89
.7	13.801	1.25463	11	1.79
.8	12.701	1.15463	11	1.69
.9	11.62	1.07592	10.8	1.59
1	10.5456	.985567	10.7	1.49
1.1	9.484	.903235	10.5	1.39
1.2	8.434	.803235	10.5	1.29
1.3	7.39579	.718035	10.3	1.19
1.4	6.37579	.631264	10.1	1.09
1.5	5.37398	.542825	9.90003	.989998
1.6	4.39118	.448078	9.80003	.889997
1.7	3.42898	.360944	9.50003	.789997
1.8	2.52811	.312111	8.10003	.689997
1.9	1.85598	.343699	5.40002	.589996
2	1.34438	.280079	4.80001	.489996
2.1	.885182	.205856	4.30001	.389996
2.2	.495986	.159995	3.10001	.289995
2.3	.254189	.121042	2.1	.189995
2.40001	6.97915E-02	4.36196E-02	1.6	8.99944E-02

Watershed 02 Price River
Subwatershed #408 Winter Quarters Canyon
Site: At The National Forest Boundary
SE 1/4, NE 1/4, Sec.2, T. 13 S., R. 6 E., SLB&M.
Data collected: 9/11/86
Run date: 9/15/86 Checked:mjw 9/15/86
Item#4
"R4CROSS2.2"

WINTER QUARTER CANYON SEEP & SPRING SURVEY
FALL 1991, SPRING 1992 and FALL 1992
LAB RESULTS, SPRING and FALL SURVEY 1992

WINTER QUARTER CANYON SEEP AND SPRING SURVEY

OCTOBER 9–11, 1991

SPRING/SEEP NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 1–1	8.47	132	0.25	3	wildlife
WQ 1–2	8.01	116	0.5	4	wildlife
WQ 1–3	a	a	seep	a	
WQ 1–4	a	a	seep	a	
WQ 1–5	a	a	seep	a	tufa deposits
WQ 1–6	7.95	122	0.5	6	tufa deposits
WQ 1–7	7.98	123	0.5	3	wildlife/stock watering
WQ 1–8	a	a	seep	a	
WQ 1–9	7.89	114	0.5	6	
WQ 1–10	a	a	seep	a	stream bed
WQ 1–11	a	a	seep	a	fractured sandstone
WQ 1–12	a	a	seep	a	
WQ 1–13	7.89	122	0.25	6	developed 1.5" pipe
WQ 1–14	a	a	seep	a	wildlife
WQ 1–15	8.46	123	0.12	9	wildlife
WQ 1–16	8.18	123	0.12	9	
WQ 1–17	a	a	seep	a	
WQ 1–18	7.91	120	0.5	4	wildlife
WQ 1–19	a	a	seep	a	
WQ 1–20	a	a	seep	a	
WQ 1–21	a	a	seep	a	
WQ 1–22	8.54	123	0.12	7	wildlife
WQ 1–23	a	a	seep	a	
WQ 1–24	a	a	seep	a	
WQ 1–25	7.95	123	1	4	wildlife
WQ 1–26	a	a	seep	a	
WQ 1–27	8.23	123	1	4	
WQ 1–28	a	a	seep	a	fractured sandstone
WQ 1–29	8.04	169	1	7	wildlife
WQ 1–30	8.22	220	0.5	6	wildlife/tufa deposits
WQ 1–31	7.81	211	2	6	wildlife/tufa deposits
WQ 1–32	7.82	219	1	7	wildlife/tufa deposits
WQ 1–33	8.22	203	0.5	7	
WQ 1–34	8.00	198	0.5	7	wildlife/stock watering
WQ 1–35	a	a	seep	7	wildlife
WQ 1–36	7.84	185	1.5	5	wildlife
WQ 1–37	a	a	seep	a	
WQ 1–38	a	a	seep	a	
WQ 1–39	8.29	175	1.5	7	developed stock watering
WQ 1–40	a	a	seep	a	
WQ 1–41	a	a	seep	a	
WQ 2–1	8.18	128	1	3	
WQ 2–2	7.93	124	1	4	
WQ 2–3	a	a	seep	3	
WQ 2–4	7.83	115	1	4	
WQ 2–5	a	a	0.5	3	

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
continued

SPRING/SEEP NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 2-6	7.76	116	5	3	wildlife
WQ 2-7	7.90	119	1.5	4	wildlife
WQ 2-8	a	a	seep	3	
WQ 2-9	a	a	seep	3	
WQ 2-10	7.80	116	1	6	wildlife
WQ 2-11	7.71	120	1.5	6	wildlife
WQ 2-12	7.89	113	3	4	wildlife
WQ 2-13	a	a	seep	a	
WQ 2-14	a	a	seep	a	
WQ 2-15	a	a	seep	a	
WQ 2-16	7.71	116	1	6	
WQ 2-17	a	a	seep	a	
WQ 2-18	a	a	seep	a	
WQ 2-19	7.66	125	1	4	wildlife
WQ 2-20	a	a	seep	a	
WQ 2-21	a	a	seep	a	
WQ 2-22	a	a	seep	a	
WQ 2-23	7.44	126	1.5	5	
WQ 2-24	7.91	123	2	5	no marking
WQ 2-25	a	a	seep	a	
WQ 2-26	a	a	seep	a	
WQ 3-1	a	a	seep	6	wildlife
WQ 3-2	8.27	121	0.5	4	wildlife
WQ 3-3	8.25	137	1	1	wildlife
WQ 3-4	7.66	116	0.5	1	wildlife
WQ 3-5	a	a	seep	2	
WQ 3-6	7.57	113	3	4	wildlife
WQ 3-7	a	a	seep	2	
WQ 3-8	a	a	seep	3	
WQ 3-9	8.03	118	1	2	wildlife
WQ 3-10	8.21	122	1	2	wildlife
WQ 3-11	8.07	111	5	2	wildlife
WQ 3-12	a	a	seep	4	
WQ 3-13	a	a	seep	3	
WQ 3-14	7.71	111	1.5	2	wildlife
WQ 3-15a	a	a	seep	2	
WQ 3-15b	a	a	seep	5	wildlife/sandstone
WQ 3-16	a	a	seep	6	wildlife/sandstone
WQ 3-17	8.47	138	1	6	wildlife/sandstone
WQ 3-18	7.33	137	1	4	wildlife
WQ 3-19	8.16	139	2	3	wildlife
WQ 3-20	8.32	138	4	5	wildlife/sandstone
WQ 3-21	a	a	seep	6	
WQ 3-22	7.88	138	2	3	wildlife
WQ 3-23	8.17	134	1	6	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
continued

SPRING/SEEP NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 3-24	7.58	140	1	4	wildlife
WQ 3-25	a	a	seep	6	
WQ 3-26	7.20	140	2	3	developed/stock watering
WQ 3-27	a	a	seep	4	
WQ 3-28	a	a	seep	4	
WQ 3-29	7.91	137	1	6	wildlife
WQ 3-30	6.37	137	0.5	6	wildlife
WQ 3-31	a	a	seep	1	
WQ 3-32	7.95	138	5	3	developed in past
WQ 3-33	a	a	seep	7	
WQ 3-34	8.01	140	1	2	wildlife
WQ 3-35	a	a	seep	3	
WQ 3-36	a	a	seep	4	
WQ 3-37	b	b	1.5	2	wildlife
WQ 3-38	7.93	228	5	2	wildlife
WQ 3-39	b	b	5	3	wildlife/spring in beaver dam
WQ 3-40	a	a	seep	3	
WQ 3-41	7.84	206	3	1	wildlife
WQ 3-42	a	a	seep	3	
WQ 3-43	8.35	200	2	1	wildlife
WQ 3-44	7.74	190	2	1	wildlife
WQ 3-45	a	a	seep	1	
WQ 3-46	8.00	184	2	1	wildlife
WQ 3-47	7.97	251	2	2	wildlife
WQ 3-48	8.13	159	1	2	wildlife
WQ 3-49	8.02	152	1	2	wildlife
WQ 3-50	a	a	seep	3	
WQ 3-51	a	a	seep	3	
WQ 3-52	a	a	seep	3	
WQ 3-53	a	a	seep	3	
WQ 3-54	a	a	seep	4	
WQ 3-55	a	a	seep	4	
WQ 3-56	a	a	seep	2	
WQ 3-57	a	a	seep	3	
WQ 3-58	8.35	136	1	3	wildlife
WQ 4-1	8.06	110	1.5	3	wildlife
WQ 4-2	a	a	seep	a	
WQ 4-3	8.05	112	1	4	
WQ 4-4	7.98	115	1	4	
WQ 4-5	7.96	113	2.5	4	wildlife
WQ 4-6	8.12	120	0.5	4	
WQ 4-7	7.95	111	0.5	4	wildlife
WQ 4-8	a	a	seep	a	
WQ 4-9	7.96	115	1.5	3	wildlife
WQ 4-10	7.95	115	1	3	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
continued

SPRING/SEEP NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 4-11	a	a	seep	3	
WQ 4-12	7.98	112	0.75	4	wildlife
WQ 4-13	8.00	117	1	3	wildlife
WQ 4-14a	8.50	142	1	6	wildlife
WQ 4-14b	8.314	177	1	4	
WQ 4-15	8.20	134	3	6	wildlife
WQ 4-16	8.30	131	0.25	6	
WQ 4-17	a	a	seep	a	
WQ 4-18	a	a	seep	a	
WQ 4-19a	8.50	127	2	6	
WQ 4-19b	8.26	150	1	3	
WQ 4-20	8.08	150	0.5	4	
WQ 4-21	8.37	154	5	3	
WQ 4-22	8.56	110	0.5	4	
WQ 4-23	8.12	143	1	4	
WQ 4-24	8.34	176	0.5	4	
WQ 4-25	8.46	258	seep	a	
WQ 4-26	8.65	480	1	4	
WQ 4-27	7.98	221	seep	a	
WQ 4-28	8.11	293	2	3	
WQ 5-1	a	a	seep	a	
WQ 5-2	a	a	seep	a	
WQ 5-3	7.86	143	<0.5	6	wildlife
WQ 5-4	8.02	130	<0.5	6	wildlife
WQ 5-5	a	a	seep	a	
WQ 5-6	7.52	139	<0.5	5	wildlife
WQ 5-7	7.69	140	<0.5	6	wildlife
WQ 5-8	a	a	seep	a	
WQ 5-9	a	a	seep	a	
WQ 5-10	a	a	seep	a	
WQ 5-11	a	a	seep	6	
WQ 5-12	7.59	137	<0.5	5	wildlife
WQ 5-13					
WQ 5-14					
WQ 5-15	a	a	seep	3	
WQ 5-16	8.37	136	0.5	6	wildlife
WQ 5-17	7.74	133	0.5	5	wildlife
WQ 5-18	7.64	132	0.5	5	wildlife
WQ 5-19	a	a	seep	a	
WQ 5-20	a	a	0.5	5	
WQ 5-21	a	a	seep	a	
WQ 5-22	8.04	177	<0.5	2	wildlife/sandstone
WQ 5-23	7.87	182	2	4	wildlife/sandstone
WQ 5-24	8.47	157	<0.5	5	wildlife/sandstone
WQ 5-25	7.56	178	<0.5	5	wildlife/sandstone

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
continued

SPRING/SEEP NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 5-26	a	a	seep	a	wildlife
WQ 5-27	8.08	175	<0.5	5	wildlife/sandstone
WQ 5-28	a	a	seep	a	
WQ 5-29	a	a	seep	a	
WQ 5-30	8.52	160	<0.5	6	wildlife/sandstone
WQ 5-31	a	a	seep	a	
WQ 5-32	8.20	155	<0.5	5	wildlife/sandstone
WQ 5-33	a	a	0.5	4	wildlife/clay
WQ 5-34	a	a	seep	a	
WQ 6-1	8.27	139	seep	4	

(a) insufficient water to sample
(b) unable to collect sample

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 1-1	a	a	seep	a	wildlife
WQ 1-2	a	a	seep	a	wildlife
WQ 1-3			dry		
WQ 1-4	8.27	344	0.5	9	
WQ 1-5	8.34	346	<0.5	9	tufa deposits
WQ 1-6	8.20	332	0.5	8	tufa deposits
WQ 1-7	8.0	431	<0.5	9	wildlife/stock
WQ 1-8	a	a	seep	a	
WQ 1-9			dry		
WQ 1-10	7.58	132	<0.5	9	stream bed
WQ 1-10A	7.50	148	<0.5	10	
WQ 1-10B	a	a	seep	a	
WQ 1-11	7.44	148	2	6	fractured sandstone
WQ 1-12			dry		
WQ 1-13	7.47	311	0.75	8	developed 1.5" pipe
WQ 1-14			dry		
WQ 1-15			dry		
WQ 1-16			dry		
WQ 1-17			dry		
WQ 1-18			dry		
WQ 1-19			dry		
WQ 1-20			dry		
WQ 1-21	8.31	286	0.5	6	
WQ 1-22			dry		

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 1-23			dry		
WQ 1-24			dry		
WQ 1-25	7.73	267	.75	6	wildlife
WQ 1-26	a	a	seep	a	
WQ 1-26A	a	a	seep	a	
WQ 1-27			dry		
WQ 1-28	7.87	199	1	6	frac. sandstone
WQ 1-29	7.42	472	<0.5	7	wildlife
WQ 1-30	7.68	553	<0.5	10	wildlife
WQ 1-31	a	a	seep	6	wildlife
WQ 1-31A	7.67	379	<0.5	6	
WQ 1-31B	7.65	383	<0.5	7	
WQ 1-32	8.11	535	<0.5	9	wildlife
WQ 1-33	8.08	550	<0.5	8	
WQ 1-34			dry		
WQ 1-35	7.84	407	<0.5	10	wildlife
WQ 1-36	7.57	392	1.5	7	wildlife
WQ 1-36A	7.83	423	<0.5	9	
WQ 1-37			dry		
WQ 1-38	7.56	431	<0.5	7	
WQ 1-38A	7.95	415	<0.5	10	wildlife
WQ 1-39	4.57	305	<0.5	7	
WQ 1-40			dry		
WQ 1-41			dry		

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 2-1	8.35	296	1	a	wildlife
WQ 2-2	a	a	seep	a	wildlife
WQ 2-3	a	a	seep	a	
WQ 2-4	7.73	381	0.5	7	
WQ 2-5	7.85	381	2	6	
WQ 2-6	7.65	357	3	7	wildlife
WQ 2-6B	7.69	387	2	7	
WQ 2-7	7.61	388	1.5	6	wildlife
WQ 2-8			dry		
WQ 2-9	a	a	seep	a	
WQ 2-10	7.95	354	0.75	6	wildlife
WQ 2-11	7.77	384	2	6	wildlife
WQ 2-12			dry		
WQ 2-13	a	a	seep	a	
WQ 2-14	a	a	seep	a	
WQ 2-15	a	a	seep	8	
WQ 2-16	7.47	334	2	8	
WQ 2-17	a	a	seep	a	
WQ 2-18	8.07	283	<0.5	10	
WQ 2-19	7.56	419	<0.5	6	wildlife
WQ 2-20			dry		
WQ 2-21			dry		
WQ 2-22			dry		

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 2-23			dry		
WQ 2-24			dry		
WQ 2-25			dry		
WQ 2-26			dry		
WQ 3-1	7.29	122	0.75	15	wildlife
WQ 3-2	7.64	274	0.5	15	wildlife
WQ 3-3	7.49	422	seep	8	wildlife
WQ 3-3A	7.99	278	seep	7	wildlife
WQ 3-4	7.87	354	<0.05	6	wildlife
WQ 3-5	a	a	seep	a	
WQ 3-6	7.53	407	0.75	7	wildlife
WQ 3-7	7.93	355	seep	4	
WQ 3-8			dry		
WQ 3-9	7.75	338	1.25	6	wildlife
WQ 3-10	8.21	327	<0.5	6	wildlife
WQ 3-11	8.14	344	3	2	wildlife
WQ 3-11A	7.71	384	1	6	wildlife
WQ 3-12	a	a	seep	6	
WQ 3-13			dry		
WQ 3-14	7.54	289	2	5	
WQ 3-15B	8.06	321	0.5	8	wildlife/sandstone
WQ 3-16	8.12	276	0.5	7	wildlife/sandstone
WQ 3-17	8.22	270	0.5	8	wildlife/sandstone
WQ 3-18	7.63	305	<0.5	6	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 3-19	7.84	250	0.5	6	wildlife
WQ 3-20	7.55	542	2	6	wildlife/sandstone
WQ 3-21	a	a	seep	9	
WQ 3-22	7.58	257	0.5	6	
WQ 3-23	a	a	seep	8	wildlife
WQ 3-25	6.97	142	seep	8	
WQ 3-26	7.46	206	1	6	developed/stock
WQ 3-27	7.67	214	<0.5	7	
WQ 3-28	7.19	153	<0.5	6	
WQ 3-29	7.49	218	<0.5	6	wildlife
WQ 3-30	6.88	44	<0.5	6	wildlife
WQ 3-31	7.92	292	<0.5	7	
WQ 3-31A	7.83	493	0.5	4	
WQ 3-31B	7.85	105	2	4	
WQ 3-31C	8.04	187	1	4	
WQ 3-32	7.43	254	<0.5	6	developed in past
WQ 3-32A	a	a	seep	7	
WQ 3-33			dry		
WQ 3-34	a	a	seep	8	
WQ 3-35	7.91	427	2	6	
WQ 3-35A	8.08	280	<0.5	6	
WQ 3-36	8.05	327	1.5	8	
WQ 3-37	b	b	2	6	wildlife
WQ 3-38	8.03	287	3.75	11	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 3-39	7.65	378	0.5	5	wildlife
WQ 3-40			dry		
WQ 3-41	7.60	402	2	4	wildlife
WQ 3-42	7.64	397	<0.5	15	
WQ 3-43	7.76	367	1.25	7	wildlife
WQ 3-44	7.57	367	3.75	5	wildlife
WQ 3-45	7.95	389	2	5	
WQ 3-46	8.04	357	3.75	7	wildlife
WQ 3-47	8.03	353	3.75	4	wildlife
WQ 3-48	8.07	269	<0.5	5	wildlife
WQ 3-49	7.87	300	1	4	wildlife
WQ 3-50	a	a	seep	7	
WQ 3-51	8.11	352	1	8	wildlife
WQ 3-52	a	a	seep	5	
WQ 3-53	a	a	seep	4	
WQ 3-54	7.83	384	seep	13	wildlife
WQ 3-55			dry		
WQ 3-55A	7.97	153	seep	7	
WQ 3-56	a	a	seep	13	
WQ 3-56A	a	a	seep	8	
WQ 3-57	a	a	seep	5	wildlife
WQ 3-58	7.99	94.6	1	7	wildlife
WQ 3-58A	7.97	153	<0.5	7	
WQ 4-1	7.76	242	2	6	

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 4-2	a	a	seep	a	
WQ 4-3	a	a	seep	a	
WQ 4-4	7.89	314	0.75	8	
WQ 4-5	7.49	336	<0.5	8	
WQ 4-6			dry		
WQ 4-6A	7.92	309	<0.5	6	wildlife
WQ 4-7	7.91	305	0.5	6	wildlife
WQ 4-8	a	a	seep	6	wildlife
WQ 4-9	8.3	370	3.75	5	wildlife
WQ 4-10	7.08	378	3.75	4	wildlife
WQ 4-11	a	a	seep	6	
WQ 4-12	7.76	347	1.25	6	wildlife
WQ 4-13	7.57	325	seep	4	wildlife
WQ 4-14A			dry		
WQ 4-14B	8.22	433	6	7	
WQ 4-15			dry		
WQ 4-16			dry		
WQ 4-17	7.72	288	<0.5	6	
WQ 4-18	7.80	345	<0.5	6	
WQ 4-18A	8.20	287	0.5	6	
WQ 4-19A			dry		
WQ 4-19B	7.69	375	1	5	wildlife/sandstone
WQ 4-20	7.86	382	1	5	wildlife/sandstone
WQ 4-21	8.33	327	3.75	7	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 4-22	a	a	seep	5	wildlife
WQ 4-23	7.84	250	1.25	7	wildlife
WQ 4-24	7.56	423	0.5	10	wildlife
WQ 4-25	a	a	seep	6	
WQ 4-25A	8.09	234	<0.5	6	wildlife
WQ 4-26	a	a	seep	6	
WQ 4-27	8.12	287	7	4	
WQ 4-28			dry		
WQ 5-1	8.13	316	<0.5	8	
WQ 5-2			dry		
WQ 5-3	a	a	seep	5	wildlife
WQ 5-4	7.89	125	<0.5	8	
WQ 5-5	a	a	seep	4	
WQ 5-6	7.60	140	<0.5	7	
WQ 5-7	7.63	142	<0.5	5	
WQ 5-8A	7.18	265	<0.5	5	
WQ 5-8B	7.66	200	0.75	5	
WQ 5-8C	a	a	seep	a	
WQ 5-9			dry		
WQ 5-9A	a	a	seep	6	
WQ 5-10			dry		
WQ 5-10A	a	a	seep	5	
WQ 5-11	7.36	412	seep	5	wildlife
WQ 5-11A	a	a	seep	6	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 5-12	7.39	407	seep	5	
WQ 5-12A	a	a	seep	4	wildlife
WQ 5-14	8.32	782	1.25	6	wildlife
WQ 5-15	a	a	seep	a	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 5-15B	7.86	167	<0.5	7	
WQ 5-16	7.21	120	<0.5	5	wildlife/sandstone
WQ 5-17	a	a	seep	4	wildlife
WQ 5-18	a	a	seep	9	wildlife/sandstone
WQ 5-19	7.99	244	seep	9	
WQ 5-19A	7.44	181	seep	6	wildlife
WQ 5-20A	7.70	348	<0.5	5	wildlife
WQ 5-20B	7.53	336	5	4	wildlife
WQ 5-21	8.23	235	<0.5	10	wildlife
WQ 5-22			dry		
WQ 5-23	8.22	376	7	9	wildlife
WQ 5-24			dry		
WQ 5-24A	8.22	318	<0.5	7	
WQ 5-25	8.13	414	<0.5	6	wildlife
WQ 5-26			dry		
WQ 5-27	7.36	419	<0.5	5	wildlife/sandstone
WQ 5-28	7.95	400	seep	6	wildlife
WQ 5-29	7.53	417	seep	6	
WQ 5-30	a	a	seep	7	
WQ 5-30A	7.45	324	seep	7	
WQ 5-30B	8.02	349	<0.5	4	
WQ 5-31			dry		
WQ 5-32	a	a	seep	6	wildlife
WQ 5-33	7.97	402	<0.5	4	wildlife

WINTER QUARTER CANYON SEEP AND SPRING SURVEY
JUNE 30 - JULY 1, 1992

SEEP/SPRING NUMBER	pH (units)	COND. (umhos/cm)	FLOW RATE (gpm)	TEMP. (c)	USE/REMARKS
WQ 6-1A	7.98	162	0.5	9	wildlife
WQ 6-1B	8.19	308	seep	4	wildlife
WQ 6-1C	a	a	seep	8	
WQ 6-1E	7.87	135	seep	4	
WQ 6-1F	7.75	156	seep	4	wildlife

a insufficient water to sample
b unable to collect sample

CHEMTECH

ANALYTICAL LABORATORY

6100 S. STRATLER
MURRAY, UTAH 84107
PHONE: (801) 262-7299
FAX: (801) 262-7378

DATE: 8-17-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U079403 - UC-228, Sample #5-23
Sampled 6-30-92

DATE SUBMITTED: 7-06-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
TDS, mg/l	267
Hardness as $CaCO_3$, mg/l	252
Bicarbonate as HCO_3, mg/l	251
Carbonate as CO_3, mg/l	0
Hydroxide as OH, mg/l	0
Chloride as Cl, mg/l	5.5
Fluoride as F, mg/l	0.16
Nitrate as NO_3-N, mg/l	0.70
Nitrite as NO_2-N, mg/l	<.005
Ammonia as NH_3-N, mg/l	0.47
Sulfide as S, mg/l	<.5
Sulfate as SO_4, mg/l	16
Phosphorus as P, mg/l	0.029
Aluminum as Al (T), mg/l	<.1
Arsenic as As (T), mg/l	<.05
Barium as Ba (T), mg/l	0.015
Boron as B (T), mg/l	<.05
Calcium as Ca (T), mg/l	92
Cadmium as Cd (T), mg/l	<.01
Chromium as Cr (T), mg/l	<.01

Rex Henderson

CHEMTECH

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DATE: 8-17-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U079403 - UC-228, Sample #5-23
Sampled 6-30-92

DATE SUBMITTED: 7-06-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
Copper as Cu (T), mg/l	<.01
Lead as Pb (T), mg/l	<.02
Magnesium as Mg (T), mg/l	9.5
Manganese as Mn (T), mg/l	<.01
Mercury as Hg (T), mg/l	<.0005
Molybdenum as Mo (T), mg/l	<.01
Nickel as Ni (T), mg/l	<.01
Potassium as K (T), mg/l	0.8
Selenium as Se (T), mg/l	<.01
Sodium as Na (T), mg/l	3.3
Zinc as Zn (T), mg/l	<.01
Iron as Fe (T), mg/l	0.11
Iron as Fe (Diss), mg/l	<.01

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DATE: 8-17-92

TO: EarthFax Engineering
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Midvale, Utah 84047

SAMPLE ID: Lab #U079404 - UC-228, Sample #5-20b
Sampled 6-30-92

DATE SUBMITTED: 7-06-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
TDS, mg/l	251
Hardness as $CaCO_3$, mg/l	230
Bicarbonate as HCO_3, mg/l	244
Carbonate as CO_3, mg/l	0
Hydroxide as OH, mg/l	0
Chloride as Cl, mg/l	3.1
Fluoride as F, mg/l	0.14
Nitrate as NO_3-N, mg/l	0.53
Nitrite as NO_2-N, mg/l	<.005
Ammonia as NH_3-N, mg/l	<.2
Sulfide as S, mg/l	<.5
Sulfate as SO_4, mg/l	28
Phosphorus as P, mg/l	0.013
Aluminum as Al (T), mg/l	<.1
Arsenic as As (T), mg/l	<.05
Barium as Ba (T), mg/l	0.026
Boron as B (T), mg/l	0.06
Calcium as Ca (T), mg/l	82
Cadmium as Cd (T), mg/l	<.01
Chromium as Cr (T), mg/l	<.01

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DATE: 8-17-92

TO: EarthFax Engineering
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Midvale, Utah 84047

SAMPLE ID: Lab #U079404 - UC-228, Sample #5-20b
Sampled 6-30-92

DATE SUBMITTED: 7-06-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
Copper as Cu (T), mg/l	0.010
Lead as Pb (T), mg/l	<.02
Magnesium as Mg (T), mg/l	10.0
Manganese as Mn (T), mg/l	<.01
Mercury as Hg (T), mg/l	<.0005
Molybdenum as Mo (T), mg/l	<.01
Nickel as Ni (T), mg/l	<.01
Potassium as K (T), mg/l	0.9
Selenium as Se (T), mg/l	<.01
Sodium as Na (T), mg/l	2.3
Zinc as Zn (T), mg/l	<.01
Iron as Fe (T), mg/l	0.06
Iron as Fe (Diss), mg/l	<.01

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DATE: 10-26-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U082498 - Skyline-Winter Quarters, 5-11B, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
TDS, mg/l	169
Hardness as $CaCO_3$, mg/l	161
Bicarbonate as HCO_3, mg/l	182
Carbonate as CO_3, mg/l	0
Chloride as Cl, mg/l	1.4
Fluoride as F, mg/l	<.1
Ammonia as NH_3-N, mg/l	<.2
Nitrate as NO_3-N, mg/l	0.30
Nitrite as NO_2-N, mg/l	0.006
Phosphorous as P, mg/l	0.015
Sulfate as SO_4, mg/l	10.2
Sulfide as S, mg/l	<.5
Aluminum as Al (T), mg/l	0.11
Arsenic as As (T), mg/l	<.01
Barium as Ba (T), mg/l	0.045
Boron as B (T), mg/l	0.18
Calcium as Ca (T), mg/l	67.0
Cadmium as Cd (T), mg/l	<.01
Chromium as Cr (T), mg/l	<.01
Copper as Cu (T), mg/l	<.01
Lead as Pb (T), mg/l	0.011

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DATE: 10-26-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U082498 - Skyline-Winter Quarters, 5-11B, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
Magnesium as Mg (T), mg/l	3.3
Manganese as Mn (T), mg/l	0.025
Mercury as Hg (T), mg/l	<.0005
Molybdenum as Mo (T), mg/l	<.01
Nickel as Ni (T), mg/l	0.045
Potassium as K (T), mg/l	0.5
Selenium as Se (T), mg/l	<.005
Sodium as Na (T), mg/l	1.1
Zinc as Zn (T), mg/l	0.028
Iron as Fe (Diss), mg/l	<.01

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DATE: 10-26-92

TO: EarthFax Engineering
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Midvale, Utah 84047

SAMPLE ID: Lab #U082499 - Skyline-Winter Quarters, 5-20B, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
TDS, mg/l	228
Hardness as $CaCO_3$, mg/l	225
Bicarbonate as HCO_3, mg/l	248
Carbonate as CO_3, mg/l	0
Chloride as Cl, mg/l	3.0
Fluoride as F, mg/l	0.14
Ammonia as NH_3-N, mg/l	<.2
Nitrate as NO_3-N, mg/l	0.33
Nitrite as NO_2-N, mg/l	0.006
Phosphorous as P, mg/l	<.01
Sulfate as SO_4, mg/l	19.9
Sulfide as S, mg/l	<.5
Aluminum as Al (T), mg/l	<.1
Arsenic as As (T), mg/l	<.01
Barium as Ba (T), mg/l	0.020
Boron as B (T), mg/l	0.18
Calcium as Ca (T), mg/l	80.5
Cadmium as Cd (T), mg/l	<.01
Chromium as Cr (T), mg/l	<.01
Copper as Cu (T), mg/l	<.01
Lead as Pb (T), mg/l	<.01

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DATE: 10-26-92

TO: EarthFax Engineering
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SAMPLE ID: Lab #U082499 - Skyline-Winter Quarters, 5-20B, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
Magnesium as Mg (T), mg/l	10.8
Manganese as Mn (T), mg/l	<.01
Mercury as Hg (T), mg/l	<.0005
Molybdenum as Mo (T), mg/l	<.01
Nickel as Ni (T), mg/l	<.01
Potassium as K (T), mg/l	1.4
Selenium as Se (T), mg/l	<.005
Sodium as Na (T), mg/l	2.3
Zinc as Zn (T), mg/l	0.012
Iron as Fe (Diss), mg/l	<.01

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DATE: 10-26-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U082500 - Skyline-Winter Quarters, 3-29, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
TDS, mg/l	147
Hardness as $CaCO_3$, mg/l	136
Bicarbonate as HCO_3, mg/l	148
Carbonate as CO_3, mg/l	0
Chloride as Cl, mg/l	3.2
Fluoride as F, mg/l	<.1
Ammonia as NH_3-N, mg/l	<.2
Nitrate as NO_3-N, mg/l	0.99
Nitrite as NO_2-N, mg/l	0.006
Phosphorous as P, mg/l	<.01
Sulfate as SO_4, mg/l	6.2
Sulfide as S, mg/l	<.5
Aluminum as Al (T), mg/l	<.1
Arsenic as As (T), mg/l	<.01
Barium as Ba (T), mg/l	0.036
Boron as B (T), mg/l	0.14
Calcium as Ca (T), mg/l	37.0
Cadmium as Cd (T), mg/l	<.01
Chromium as Cr (T), mg/l	<.01
Copper as Cu (T), mg/l	<.01
Lead as Pb (T), mg/l	<.01

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DATE: 10-26-92

TO: EarthFax Engineering
7324 So. 1300 E. STE 100
Midvale, Utah 84047

SAMPLE ID: Lab #U082500 - Skyline-Winter Quarters, 3-29, 10-08-92

DATE SUBMITTED: 10-09-92

CERTIFICATE OF ANALYSIS

PARAMETER	DETECTED
Magnesium as Mg (T), mg/l	10.2
Manganese as Mn (T), mg/l	<.01
Mercury as Hg (T), mg/l	<.0005
Molybdenum as Mo (T), mg/l	<.01
Nickel as Ni (T), mg/l	0.042
Potassium as K (T), mg/l	0.4
Selenium as Se (T), mg/l	<.005
Sodium as Na (T), mg/l	1.4
Zinc as Zn (T), mg/l	0.035
Iron as Fe (Diss), mg/l	<.01

Rex Henderson

UNITED STATES OF AMERICA
FOREST SERVICE WATER RIGHTS
WUC-NO'S

W.U.C. NO. 1041 NAME: United States of America Forest Service MAP: 28

SOURCE: Andrew Dairy Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters SW¼NW¼ Sec. 25, T12S, R6E, SLBM to point where stream leaves NE¼NE¼ Sec. 24, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - Granger Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1058
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1040 NAME: United States of America Forest Service MAP: 28

SOURCE: East Fork Dairy Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance NE¼SW¼ Sec. 25, T12S, R6E, SLBM to point where stream enters private property SW¼SE¼ Sec. 24, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - Granger Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1058
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1044 NAME: United States of America Forest Service MAP: 28

SOURCE: Wife Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance SW¼NE¼ Sec. 26, T12S, R6E, SLBM to point of stream's confluence with Price River NE¼SE¼ Sec. 13, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

W.U.C. NO. 1043

NAME: United States of America
Forest Service

MAP: 28

SOURCE: Wife Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance SW¼NE¼ Sec. 26, T12S, R6E, SLBM to point where stream conflues with Fish Creek NE¼SE¼ Sec. 13, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - Granger Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1058
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1046

NAME: United States of America
Forest Service

MAP: 28

SOURCE: Spring

FLOW: .015 cfs

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on spring located in SW¼SW¼ Sec. 27, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U C. NO. 1115

NAME: United States of America
Forest Service

MAP: 27

SOURCE: Gooseberry Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters NE¼SW¼ Sec. 31, T12S, R6E, SLBM to point where stream leaves SE¼SE¼ Sec. 30, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to October 10

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 727 sheep and goats - Mansion Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1115, 1117
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.45 acre-feet.

W.U.C. NO. 1116 NAME: United States of America Forest Service MAP: 27

SOURCE: Gooseberry Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters NE¼SW¼ Sec. 31, T12S, R6E, SLBM to point where stream leaves SE¼SE¼ Sec. 30, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to October 10

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 269 sheep and goats - East Gooseberry Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1111, 1112, 1114, 1116, 1118, 1119, 1120, 1121, 1122
Diversion any each or all claims; total yearly diversion under all claims mentioned 0.54 acre-feet.

. . . . . .

W.U.C. NO. 1114 NAME: United States of America Forest Service MAP: 27

SOURCE: Tributary to Mill Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters SW¼NW¼ Sec. 33, T12S, R6E, SLBM to point of stream's confluence with Mill Creek in NW¼NW¼ Sec. 33, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 10

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 269 sheep and goats - East Gooseberry Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1111, 1112, 1114, 1116, 1118, 1119, 1120, 1121, 1122
Diversion any each or all claims; total yearly diversion under all claims mentioned 0.54 acre-feet.

. . . . . .

W.U.C. NO. 1049 NAME: United States of America Forest Service MAP: 28

SOURCE: French Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in SW¼SE¼ Sec. 33, T12S, R6E, SLBM to point of stream's confluence with Price River in SE¼NE¼ Sec. 14, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

W.U.C. NO. 1050 NAME: United States of America Forest Service MAP: 28

SOURCE: French Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in SW¼SE¼ Sec. 33, T12S, R6E, SLBM to point of stream's confluence with Price River in SE¼NE¼ Sec. 14, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,000 sheep and goats - Bean Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1050, 1053, 1054, 1056, 1109, 1113
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.0 acre-feet.

. . . . . .

W.U.C. NO. 1045 NAME: United States of America Forest Service MAP: 28

SOURCE: Spring FLOW: .015 cfs

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on spring located in NE¼NW¼ Sec. 34, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1047 NAME: United States of America Forest Service MAP: 28

SOURCE: Tributary to French Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in NE¼NW¼ Sec. 34, T12S, R6E, SLBM to point of stream's confluence with French Creek in NE¼NE¼ Sec. 22, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

W.U.C. NO. 1048

NAME: United States of America
Forest Service

MAP: 28

SOURCE: Tributary to French Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters NW¼NW¼ Sec. 34, T12S, R6E, SLBM to point where stream conflues with French Creek in SW¼SW¼ Sec. 22, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1,156 sheep and goats - French Creek Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1044, 1045, 1046, 1047, 1048, 1049, 1051, 1057
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 3638

NAME: D. Euray Allred

MAP: 28d

SOURCE: Spring

FLOW: .011 cfs

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on spring located in NW¼NE¼ Sec. 35, T12S, R6E, SLBM.

PERIOD OF USE: May 1 to November 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 3,000 sheep

CLAIMS USED FOR PURPOSE DESCRIBED: 3631, 3632, 3633, 3634, 3635, 3636, 3638
Diversion any each or all claims; total yearly diversion under all claims mentioned 9.0 acre-feet.

. . . . . .

W.U.C. NO. 3631

NAME: D. Euray Allred

MAP: 28

SOURCE: Woods Canyon Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters SW¼NE¼ Sec. 35, T12S, R6E, SLBM to point where stream leaves SE¼NW¼ Sec. 31, T12S, R7E, SLBM.

PERIOD OF USE: May 1 to November 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 3,000 sheep

CLAIMS USED FOR PURPOSE DESCRIBED: 3631, 3632, 3633, 3634, 3635, 3636, 3638
Diversion any each or all claims; total yearly diversion under all claims mentioned 9.0 acre-feet.

W.U.C. NO. 1037 NAME: United States of America Forest Service MAP: 28

SOURCE: Tributary to Winter Quarters Canyon Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in NE¼NW¼ Sec. 3, T13S, R6E, SLBM, to point of stream's confluence with Winter Quarters Canyon in NW¼SE¼ Sec. 2, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1156 sheep and goats - Granger Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1058
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1036 NAME: United States of America Forest Service MAP: 28

SOURCE: Spring FLOW: .015 cfs

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on spring located in NW¼NW¼ Sec. 3, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 996 sheep and goats - Winter Quarters Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.00 acre-feet.

. . . . . .

W.U.C. NO. 1038 NAME: United States of America Forest Service MAP: 28

SOURCE: Woods Canyon Creek FLOW:

TYPE OF RIGHT: Diligence PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in NW¼NW¼ Sec. 3, T13S, R6E, SLBM to point where stream leaves SE¼NW¼ Sec. 35, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1156 sheep and goats - Granger Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1058
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.16 acre-feet.

. . . . . .

W.U.C. NO. 1112 NAME: United States of America
Forest Service

MAP: 27

SOURCE: Mill Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in NE¼NW¼ (lot 3) Sec. 4, T13S, R6E, SLBM to point where stream leaves private property in SE¼NE¼ Sec. 29, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to October 10

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 269 sheep and goats - East Gooseberry Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: See Water User's Claim 1119, page 421
Diversion any each or all claims; total yearly diversion under all claims mentioned .54 acre-feet.

. . . . . .

W.U.C. NO. 1113 NAME: United States of America
Forest Service

MAP: 27

SOURCE: Mill Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance located in Lot 3, Sec. 4, T13S, R6E, SLBM, to point where stream leaves SE¼NE¼ Sec. 29, T12S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 1000 sheep and goats - Bean Ridge Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1053, 1054, 1056, 1109, 1113, 1050,
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.00 acre-feet.

. . . . . .

W.U.C. NO. 1119 NAME: United States of America
Forest Service

MAP: 27

SOURCE: Tributary to Gooseberry Creek

FLOW:

TYPE OF RIGHT: Diligence

PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in NW¼NE¼ Sec. 6, T13S, R6E, SLBM, to point of stream's confluence with Gooseberry Creek in NW¼SE¼ Sec. 6, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to October 10

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 269 sheep and goats - East Gooseberry Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1112, 1114, 1116, 1118, 1119, 1120, 1121, 1122
Diversion any each or all claims; total yearly diversion under all claims mentioned .54 acre-feet.

. . . . . .

W.U.C. NO. 1126 NAME: United States of America
Forest Service

MAP: 37

FLOW: .015 cfs

SOURCE: Spring

PRIORITY: 1860

TYPE OF RIGHT: Diligence

POINT OF DIVERSION: Stock water directly on spring located in SW¼SE¼ Sec. 7, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to October 5

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 314 sheep and goats - Brooks Canyon Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1123, 1124, 1125, 1126, 1127, 1143
Diversion any each or all claims; total yearly diversion under all claims mentioned .31 acre-feet.

. . . . . .

W.U.C. NO. 1032 NAME: United States of America
Forest Service

MAP: 38

FLOW:

SOURCE: Tributary to Winter Quarters Canyon Creek

PRIORITY: 1860

TYPE OF RIGHT: Diligence

POINT OF DIVERSION: Stock water directly on stream from point of strream's issuance in SW¼NW¼ Sec. 10, T13S, R6E, SLBM to point of stream's confluence with Winter Quarters Canyon Creek in SE¼SE¼ Sec. 3, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 996 sheep and goats - Winter Quarters Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.00 acre-feet.

. . . . . .

W.U.C. NO. 1031 | NAME: United States of America Forest Service | MAP: 38

SOURCE: Tributary to Winter Quarters Canyon Creek | FLOW:

TYPE OF RIGHT: Diligence | PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point of stream's issuance in SW¼SE¼ Sec. 10, T13S, R6E, SLBM, to point of stream's confluence with Winter Quarters Canyon Creek in SE¼SE¼ Sec. 3, T13S, R6E, SLBM.

PERIOD OF USE: July 1 to September 30

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 996 sheep and goats - Winter Quarters Allotment

CLAIMS USED FOR PURPOSE DESCRIBED: 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036
Diversion any each or all claims; total yearly diversion under all claims mentioned 1.00 acre-feet.

. . . . . .

W.U.C. NO. 3070 | NAME: John Marakis Estate (1/2 interest) | MAP: 38

SOURCE: Eccles Canyon Creek | FLOW:

TYPE OF RIGHT: Diligence | PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters SW¼SE¼ Sec. 13, T13S, R6E, SLBM to point where stream leaves NE¼NE¼ Sec. 24, T13S, R6E, SLBM.

PERIOD OF USE: January 1 to December 31

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 4,000 sheep, 10 horses

CLAIMS USED FOR PURPOSE DESCRIBED: See Water User's Claim 463, page 415
Diversion any each or all claims; total yearly diversion under all claims mentioned 22.68 acre-feet.

. . . . . .

W.U.C. NO. 3071 | NAME: Nick Marakis (1/2 interest) | MAP: 38

SOURCE: Eccles Canyon Creek | FLOW:

TYPE OF RIGHT: Diligence | PRIORITY: 1860

POINT OF DIVERSION: Stock water directly on stream from point where stream enters SW¼SE¼ Sec. 13, T13S, R6E, SLBM, to point where stream leaves NE¼NE¼ Sec. 24, T13S, R6E, SLBM.

PERIOD OF USE: January 1 to December 31

PURPOSE, EXTENT & PLACE OF USE: Stockwatering: 4,000 sheep, 10 horses

CLAIMS USED FOR PURPOSE DESCRIBED: See Water User's Claim 463, page 415
Di version any each or all claims; total yearly diversion under all claims mentioned 22.68 acre-feet.

. . . . . .

IN THE DISTRICT COURT OF THE SEVENTH JUDICIAL DISTRICT,
IN AND FOR CARBON COUNTY, STATE OF UTAH

IN THE MATTER OF THE GENERAL DETERMINATION OF RIGHTS TO THE USE OF WATER, BOTH SURFACE AND UNDERGROUND, WITHIN THE DRAINAGE AREA OF THE PRICE RIVER AND OF THE DRAINAGE AREA OF THE GREEN RIVER FROM THE CONFLUENCE OF THE PRICE AND GREEN RIVERS TO THE CONFLUENCE OF THE GREEN AND COLORADO RIVERS EXCLUDING THE DRAINAGE AREA OF THE SAN RAFAEL RIVER IN UTAH.

NOTE: Use this form to assert your water rights in the pending judicial adjudication. The State Engineer has made a hydrographic survey of this area, which includes your water rights and uses. Your receipt of this form constitutes notice to you that the survey has been completed and that your Water User's Claim is due within 90 days after you recieve this form. Under Utah law, unless you timely complete and file this form, your water rights cannot be recognized and you may not be able to assert them further. File this form with the Clerk of the District Court, at PRICE, Utah; and a copy with the State Engineer, at 1636 West North Temple, Salt Lake City, Utah 84116.

STATEMENT OF WATER USER'S CLAIM

CODE and SERIAL NUMBER 91 4323 (782) MAP: 27

1. **OWNER INFORMATION:** Name: United States of America - Forest Service
Address: 324 25th Street
City: Ogden State: UT Zip Code: 84401

2. **PRIORITY OF RIGHT:** 1860 Interest Claimed: Full

3. **QUANTITY OF WATER:** _____ cfs and/or 0.1 acre feet

4. **RIGHT EVIDENCED BY:** Diligence

5. **SOURCE:** Pipeline Pond **DRAINAGE:** Price River

POINT(S) OF DIVERSION: **COUNTY:** Carbon
(must be described with reference to U. S. Government Survey Corner)
~~stockwater from a pond located in Lot #3, sec. 4, T. 13 S., R. 6 E., SLBM~~

Diverting Works (name): _____

6. **POINT(S) OF REDIVERSION:** The water is rediverted from _____ at a point _____

7. **STORAGE:** Water is to be stored in _____ Res. from _____ to _____ Capacity _____ ac. ft., Inundating _____ acres, Height of Dam _____ feet. The area inundated by the reservoir includes all or part of each of the following legal subdivisions: _____

8. **NATURE, PERIOD, PURPOSE AND EXTENT OF USE:**
Claims used for purpose described:

STOCKWATERING: From 6/1 to 10/31 Animal Units 970 Sheep & Goats
DOMESTIC: From _____ to _____ No. Families _____ Persons _____
MUNICIPAL: From _____ to _____ Municipality _____
MINING: From _____ to _____ District _____
Mine _____ Ores _____
POWER: From _____ to _____ Rated Capacity _____
Power Plant Name _____
OTHER: From _____ to _____ Description of Use _____
IRRIGATION: From _____ to _____ Total Acres _____
Sole Supply Acres _____ Area Irrigated in legal subdivisions of land by 40-acre tract. _____

9. **PLACE OF USE:** If other than as described in area irrigated, in legal subdivisions of land by 40-acre tract: _____

10. **POINT(S) OF RETURN:** Amount of water consumed _____ Amount of water returned _____ The water will be returned to the natural stream at a point(s) described as follows: _____

11. **EXPLANATORY OR OTHER FACTS:** Winter Quarters No. Allotment 1033, 1034, 1035, 1036, 4361
(All Water User Claims for all sources of water for same stock)

12. ~~The undersigned hereby enters his appearance in this water adjudication and waives service of summons or other process.~~

STATE OF UTAH)
) SS.
COUNTY OF Weber)

The undersigned swears on oath that he makes and certifies this water user's claim either as the claimant himself or as the duly-authorized agent of the claimant, that he has read and knows the contents of the claim, that he signs the same, and that the information supplied therein is true to the best of his knowledge and belief.

Title: Randall R. Hall, Agent
(Individual or Office)

Randall R. Hall
Signature (for) J. S. TIXIER, Regional Forester

Subscribed and sworn to before me this 6th day of January 87

Residing at: Willard, Box Elder County, Utah
Commission expires: 12-11-88

Sandra S. Carlson
Notary Public

NOTARY PUBLIC
SANDRA S. CARLSON
Commission Expires
Dec. 11, 1988
STATE OF UTAH

IN THE DISTRICT COURT OF THE SEVENTH JUDICIAL DISTRICT,
IN AND FOR CARBON COUNTY, STATE OF UTAH

IN THE MATTER OF THE GENERAL DETERMINATION OF RIGHTS TO THE USE OF WATER, BOTH SURFACE AND UNDERGROUND, WITHIN THE DRAINAGE AREA OF THE PRICE RIVER AND OF THE DRAINAGE AREA OF THE GREEN RIVER FROM THE CONFLUENCE OF THE PRICE AND GREEN RIVERS TO THE CONFLUENCE OF THE GREEN AND COLORADO RIVERS EXCLUDING THE DRAINAGE AREA OF THE SAN RAFAEL RIVER IN UTAH.

NOTE: Use this form to assert your water rights in the pending judicial adjudication. The State Engineer has made a hydrographic survey of this area, which includes your water rights and uses. Your receipt of this form constitutes notice to you that the survey has been completed and that your Water User's Claim is due within 90 days after you recieve this form. Under Utah law, unless you timely complete and file this form, your water rights cannot be recognized and you may not be able to assert them further. File this form with the Clerk of the District Court, at PRICE, Utah; and a copy with the State Engineer, at 1636 West North Temple, Salt Lake City, Utah 84116.

STATEMENT OF WATER USER'S CLAIM

CODE and SERIAL NUMBER 91 4361 (336) MAP: 38

1. **OWNER INFORMATION:** Name: United States of America - Forest Service
Address: 324 25th Street
City: Ogden State: UT Zip Code: 84401

2. **PRIORITY OF RIGHT:** 1860 Interest Claimed: Full

3. **QUANTITY OF WATER:** 0.015 cfs and/or _____ acre feet

4. **RIGHT EVIDENCED BY:** Diligence

5. **SOURCE:** Trib. of Winter Qtrs. Canyon Creek **DRAINAGE:** Price River
COUNTY: Carbon
POINT(S) OF DIVERSION:
(must be described with reference to U. S. Government Survey Corner)
Stockwater directly on a stream from a point where the stream enters SW1/4NW1/4, sec. 10, T. 13 S., R. 6 E., SLBM, to a point where the stream leaves SE1/4SE1/4, sec. 03, T. 13 S., R. 6 E., SLBM
Diverting Works (name): _____

6. **POINT(S) OF REDIVERSION:** The water is rediverted from _____
at a point _____

7. **STORAGE:** Water is to be stored in _____ Res. from _____ to _____ Capacity _____ ac. ft., Inundating _____ acres, Height of Dam _____ feet. The area inundated by the reservoir includes all or part of each of the following legal subdivisions: _____

8. **NATURE, PERIOD, PURPOSE AND EXTENT OF USE:**
Claims used for purpose described: _____

STOCKWATERING: From 6/1 to 10/31 Animal Units 920 Sheep & Goats
DOMESTIC: From _____ to _____ No. Families _____ Persons _____
MUNICIPAL: From _____ to _____ Municipality _____
MINING: From _____ to _____ District _____
Mine _____ Ores _____
POWER: From _____ to _____ Rated Capacity _____
Power Plant Name _____
OTHER: From _____ to _____ Description of Use _____

IRRIGATION: From _____ to _____ Total Acres _____
Sole Supply Acres _____ Area Irrigated in legal subdivisions of land by 40-acre tract. _____

9. **PLACE OF USE:** If other than as described in area irrigated, in legal subdivisions of land by 40-acre tract: _____

10. **POINT(S) OF RETURN:** Amount of water consumed _____ Amount of water returned _____ The water will be returned to the natural stream at a point(s) described as follows: _____

11. **EXPLANATORY OR OTHER FACTS:** No. Winter Quarters Allotment
1033, 1034, 1035, 1036, 4361
(All Water User Claims for all sources of water for same stock)

12. ~~The undersigned hereby enters his appearance in this water adjudica-tion and waives service of summons or other process.~~

STATE OF UTAH)
) SS.
COUNTY OF Weber)

The undersigned swears on oath that he makes and certifies this water user's claim either as the claimant himself or as the duly-authorized agent of the claimant, that he has read and knows the contents of the claim, that he signs the same, and that the information supplied therein is true to the best of his knowledge and belief.

Title: Randall R. Hall, Agent
(Individual or Office)

Randall R. Hall
Signature (for) J. S. TIXIER, Regional Forester

Subscribed and sworn to before me this 16th day of January 1987

Residing at: Willard, Box Elder County, Utah
Commission expires: 12-11-88

Sandra S. Carlson
Notary Public

NOTARY PUBLIC
SANDRA S. CARLSON
Commission Expires
Dec. 11, 1988
STATE OF UTAH

WUC: 93-1 NAME: U.S. Forest Service INT: 100% FLOW:
TYPE OF RIGHT: Diligence PRIORITY: 1875 SOURCE: Kitchen Fork of Huntington Creek MAP: 1N
POINT OF DIVERSION: Stockwatering directly on stream from a point in Lot 5 Sec 4, T13S, R6E, SLBM, to a point in Lot 6 Sec 9, T13S, R6E, SLBM.

CLAIMS USED FOR PURPOSE DESCRIBED: 1,91-1112,91-1114,91-1116,91-1118/91-1122
PERIOD OF USE: 07/01 TO 10/10
###STOCKWATERING: 54 Equivalent Livestock Units

East Gooseberry Allotment

Diversion any, each, or all claims; total yearly diversion under all claims mentioned .43 acre-feet.

WUC: 93-2 NAME: U.S. Forest Service INT: 100% FLOW:
TYPE OF RIGHT: Diligence PRIORITY: 1875 SOURCE: Kitchen Fork of Huntington Creek MAP: 1N
POINT OF DIVERSION: Stockwatering directly on stream from a point in NE¼SW¼ Sec 4, T13S, R6E, SLBM, to a point in Lot 6 Sec 9, T13S, R6E, SLBM.

CLAIMS USED FOR PURPOSE DESCRIBED: 2,91-1028/91-1036
PERIOD OF USE: 07/01 TO 09/30
###STOCKWATERING: 200 Equivalent Livestock Units

Winterquarters Allotment

Diversion any, each, or all claims; total yearly diversion under all claims mentioned 1.42 acre-feet.

WUC: 93-3 NAME: U.S. Forest Service INT: 100% FLOW:
TYPE OF RIGHT: Diligence PRIORITY: 1875 SOURCE: Kitchen Fork of Huntington Creek MAP: 1
POINT OF DIVERSION: Stockwatering directly on stream from a point in Lot 8 Sec 9, T13S, R6E, SLBM, to a point in Lot 10 Sec 9, T13S, R6E, SLBM.

CLAIMS USED FOR PURPOSE DESCRIBED: 3,5,6,9,1539,1540,1541,91-1024/91-1027
PERIOD OF USE: 07/01 TO 09/30
###STOCKWATERING: 200 Equivalent Livestock Units

Eccles Allotment

Diversion any, each, or all claims; total yearly diversion under all claims mentioned 1.42 acre-feet.

WUC: 93-232 NAME: Crowther, Osmond & Idena J. INT: 100% FLOW: 0.011 cfs
TYPE OF RIGHT: Diligence PRIORITY: 1902 SOURCE: Brooks Canyon Divide Spring #1 MAP: 1
POINT OF DIVERSION: Stockwatering directly on spring located in SW¼SW¼ Sec 9, T13S, R6E, SLBM.

CLAIMS USED FOR PURPOSE DESCRIBED: 4,232,279,432,435,449
PERIOD OF USE: 06/01 TO 10/15
###STOCKWATERING: 604 Equivalent Livestock Units

Diversion any, each, or all claims; total yearly diversion under all claims mentioned 6.36 acre-feet.

WUC: 93-433 NAME: Allen, Lloyd J.

TYPE OF RIGHT: Diligence INT: 100% FLOW: 0.011 cfs

POINT OF DIVERSION: Stockwatering directly on spring located in SE¼SW¼ Sec 9, T13S, R6E, SLBM. PRIORITY: 1875 SOURCE: Spring MAP: 1

CLAIMS USED FOR PURPOSE DESCRIBED: 433

###STOCKWATERING: 302 Equivalent Livestock Units

Annual water allowed 3.18 acre feet. PERIOD OF USE: 06/01 TO 10/15

WUC: 93-434 NAME: Blood, David B.

TYPE OF RIGHT: Diligence INT: 100% FLOW:

POINT OF DIVERSION: Stockwatering directly on stream from a point in N 330 ft. W 100 ft. from S¼ corner, Sec 9, T13S, R6E, SLBM, to a point in SE¼SW¼ Sec 9, T13S, R6E, SLBM. PRIORITY: 1875 SOURCE: Kitchen Fork of Huntington Creek MAP: 1

CLAIMS USED FOR PURPOSE DESCRIBED: 434

###STOCKWATERING: 302 Equivalent Livestock Units

Annual water allowed 4.25 acre feet. PERIOD OF USE: 06/01 TO 11/30

WUC: 93-5 NAME: U.S. Forest Service

TYPE OF RIGHT: Diligence INT: 100% FLOW: 0.011 cfs

POINT OF DIVERSION: Stockwatering directly on spring located in SE¼SW¼ Sec 10, T13S, R6E, SLBM. PRIORITY: 1875 SOURCE: North Huntington Spring MAP: 2

CLAIMS USED FOR PURPOSE DESCRIBED: 3,5,6,9,1539,1540,1541,91-1024/91-1027

###STOCKWATERING: 200 Equivalent Livestock Units

Eccles Allotment PERIOD OF USE: 07/01 TO 09/30

Diversion any, each, or all claims; total yearly diversion under all claims mentioned 1.42 acre feet.

WUC: 93-6 NAME: U.S. Forest Service

TYPE OF RIGHT: Diligence INT: 100% FLOW:

POINT OF DIVERSION: Stockwatering directly on stream from a point in SE¼SW¼ Sec 10, T13S, R6E, SLBM, to a point in Lot 4 Sec 15, T13S, R6E, SLBM. PRIORITY: 1875 SOURCE: North Fork Huntington Creek MAP: 2

CLAIMS USED FOR PURPOSE DESCRIBED: 3,5,6,9,1539,1540,1541,91-1024/91-1027

###STOCKWATERING: 200 Equivalent Livestock Units

Eccles Allotment PERIOD OF USE: 07/01 TO 09/30

Diversion any, each, or all claims; total yearly diversion under all claims mentioned 1.42 acre feet.

SURFACE WATER RIGHTS
1992

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 3635	Allred, D. Euray	Unnamed Stream	------	Stock Watering
91 3633	Allred, D. Euray	Winter Quarters Creek	------	Stock Watering
E1934	UCO, Incorporated	Underground Water Well	------	Other
91 463	Eureka Energy	Unnamed Spring	.0110	Stock Watering
91 424	Marakis, Nick	Unnamed Spring	.0110	
91 471	Marakis, John	Unnamed Stream	------	
91 431	Marakis, Nick	Unnamed Stream	------	
91 1029	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
91 1037	USA Forest Service	Bob's Canyon Creek	------	Stock Watering
91 1033	USA Forest Service	Winter Quarters Canyon Creek	------	Stock Watering
91 1034	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
91 1112	USA Forest Service	Mill Creek	------	
91 1033	USA Forest Service	Winter Quarters Canyon Creek	------	Stock Watering
91 1113	USA Forest Service	Mill Creek	------	Stock Watering
91 4323	USA Forest Service	Pipeline Pond	------	Stock Watering
93 1	USA Forest Service	Kitchen Fork of Huntington Creek	------	Stock Watering
93 2	USA Forest Service	Kitchen Fork of Huntington Creek	------	Stock Watering
91 3971	Peterson, Lionel L.	Spring	.0220	
91 3985	Peterson, Lionel L.	Spring	.0220	
91 3974	Peterson, Lionel L.	Spring	.0220	
91 3973	Peterson, Lionel L.	Spring	.0220	
91 3975	Peterson, Lionel L.	Spring	.0220	
91 3976	Peterson, Lionel L.	Spring	.0220	

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 3977	Peterson, Lionel L.	Spring	.0220	
91 3978	Peterson, Lionel L.	Spring	.0220	
91 3980	Peterson, Lionel L.	Spring	.0220	
91 3979	Peterson, Lionel L.	Spring	.0220	
91 3982	Peterson, Lionel L.	Spring	.0220	
91 3981	Peterson, Lionel L.	Spring	.0220	
91 3983	Peterson, Lionel L.	Spring	.0220	
91 4073	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4075	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4067	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4078	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4070	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4077	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4069	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4079	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4076	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4072	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4080	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4064	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4071	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4068	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4074	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4066	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4081	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 4082	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4065	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4083	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4361	USA Forest Service	Trib. of Winter Quarters Canyon	------	Stock Watering
91 1032	USA Forest Service	Trib. of Winter Quarters Canyon	------	Stock Watering
91 1006	USA Forest Service	Tribs. of North Fork of Huntington	40.0	Irrigation
93 5	USA Forest Service	North Huntington Spring	.0110	Stock Watering
93 6	USA Forest Service	North Fork Huntington Creek	------	Stock Watering
91 1031	USA Forest Service	Trib. of Winters Quarters Canyon	------	Stock Watering
91 463	Eureka Energy	Unnamed Spring	.0110	Stock Watering
91 1030	USA Forest Service	Trib. to Winter Quarters Canyon	------	Stock Watering
91 471	Marakis, John	Unnamed Stream	------	
91 431	Marakis, Nick	Unnamed Stream	------	
91 476	Marakis, John	Unnamed Stream	------	
91 436	Marakis, Nick	Unnamed Stream	------	
91 432	Marakis, Nick	Unnamed Spring	.0110	
91 472	Marakis, John	Unnamed Spring	.0110	
91 433	Marakis, Nick	Unnamed Spring	.0110	
91 473	Marakis, John	Unnamed Spring	.0110	
91 4345	USA Forest Service	Unnamed Spring	.0150	Stock Watering
E1114	Coastal States Energy Co.	Underground Water Well	------	Other
E1560	Coastal States Energy Co.	-----	------	Mining
91 1025	USA Forest Service	Trib. to Eccles Canyon Creek	------	Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 1028	USA Forest Service	Eccles Canyon Creek	------	Stock Watering
91 1027	USA Forest Service	Eccles Canyon Creek	------	Stock Watering
91 3070	Marakis, John	Eccles Canyon Creek	------	
91 3071	Marakis, Nick	Eccles Canyon Creek	------	
E1906	Coastal States Energy Co.		------	Other
91 1030	USA Forest Service	Trib. to Winter Quarters Canyon	------	Stock Watering
91 1029	USA Forest Service	Trib. to Winter Quarters Canyon	------	Stock Watering
93 1540	USA Forest Service	Moss Pond Spring	.0110	Stock Watering
91 1026	USA Forest Service	Trib. to Eccles Canyon Creek	------	Stock Watering
91 1028	USA Forest Service	Eccles Canyon Creek	------	Stock Watering
91 1027	USA Forest Service	Eccles Canyon Creek	------	Stock Watering
93 1539	USA Forest Service	Eccles Spring	.0110	Stock Watering
93 1541	USA Forest Service	Eccles "A" Pond Spring	.0110	Stock Watering
93 3677	USA Forest Service	Kitchen Spring	------	
93 6	USA Forest Service	North Fork Huntington Creek	------	Stock Watering
93 1006	USA Bureau of Reclamation	Tribs. of North Fork of Huntington	40.0	Irrigation
91 4070	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4072	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
91 4074	Gooseberry Enterprises Inc.	Unnamed Springs	------	Domestic
93 3	USA Forest Service	Kitchen Fork of Huntington Creek	------	Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
93 435	Crowther Investment Company	Unnamed Springs	.0110	Stock Watering
93 432	Crowther Investment Company	Brooks Canyon Divide Spring	.0110	Stock Watering
E2536	Cowley, Stanley A. or Marie W.	Unnamed Spring	------	Domestic
93 279	Crowther Investment Company	Unnamed Spring	.0110	Domestic/Stock Watering
93 449	Crowther Investment Company	Unnamed Spring	.0110	Domestic/Stock Watering
93 1006	USA Bureau of Reclamation	Tribs. of North Fork of Huntington	40.0	Irrigation
93 9	USA Forest Service	Kitchen Fork of Huntington Creek	------	Stock Watering
E2537	Dingman, Roy	Unnamed Spring	------	Domestic
93 4	Crother Investment Company	Kitchen Fork of Huntington Creek	------	Stock Watering
93 345	Christensen, Richard S.	Unnamed Spring	.0200	Stock Watering
93 365	Marriott, Douglas G.	Spring	.0200	Stock Watering
93 344	Shumway, R. Phil	Spring	.0200	Stock Watering
93 343	Stone, David J.	Spring	.0200	Stock Watering
93 333	Christensen, Richard S.	Unnamed Spring	.0200	Stock Watering
93 331	Stone, David J.	Spring	.0200	Stock Watering
93 332	Shumway, R. Phil	Spring	.0200	Stock Watering
93 334	Marriott, Douglas G.	Spring	.0200	Stock Watering
91 130	Sanpete Water Conser. Dist.	Cabin Hollow Creek, Brooks Cr.	30.0	Irrigation/Other
A9237	Sanpete Water Conser. Dist.	Cabin Hollow Creek, Brooks Cr.	30.0	Irrigation
93 430	Clayson, Eli	Unnamed Spring	.0222	Stock Watering
93 429	Evans, Don	Spring	.0222	Stock Watering
93 404	Brown, Russell O.	Unnamed Spring	.0222	Stock Watering
93 431	Thorstenson, Clark T.	Spring	.0222	Stock Watering
93 411	Hunt, M. Dover	Spring	.0222	Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
93 380	Hunt, M. Dover	Spring	.0222	Stock Watering
93 391	Clayson, Eli	Unnamed Spring	.0222	Stock Watering
93 379	Brown, Russell O.	Unnamed Spring	.0222	Stock Watering
93 402	Thorstenson, Clark T.	Spring	.0222	Stock Watering
93 381	Evans, Don	Spring	.0222	Stock Watering
91 1036	USA Forest Service	Tone Spring	.0150	Stock Watering
91 1038	USA Forest Service	Woods Canyon Creek	------	Stock Watering
91 1037	USA Forest Service	Bob's Canyon Creek	------	Stock Watering
91 1034	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
91 1035	USA Forest Service	Rock Spring	.0150	Stock Watering
91 1031	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
91 1032	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
91 4361	USA Forest Service	Trib. Winter Quarters Canyon	------	Stock Watering
93 232	Crowther, Osmond and Idena J.	Brooks Canyon Divide Spring	.0110	Stock Watering
93 433	Allen, Lloyd J.	Unnamed Spring	.0110	Stock Watering
93 434	Blood, David B.	Kitchen Fork of Huntington Creek	------	Stock Watering
91 1148	Nicolaides, Tom & Leon	Green Canyon Stream	------	Stock Watering
91 474	Marakis, John	Unnamed Spring	.0110	

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 434	Marakis, Nick	Unnamed Spring	.0110	
91 1039	USA Forest Service	Ledge Spring	.0150	Stock Watering
91 1041	USA Forest Service	Andrew Dairy Creek	------	Stock Watering
91 4320	USA Forest Service	Andrew Dairy Pond	------	Stock Watering
91 1040	USA Forest Service	East Fork Dairy Creek	------	Stock Watering
91 1109	USA Forest Service	Gooseberry Creek	------	Stock Watering
91 1108	USA Forest Service	Gooseberry Creek	------	Stock Watering
91 1108	USA Forest Service	Gooseberry Creek	------	Stock Watering
91 1107	USA Forest Service	Silver Creek	------	Stock Watering
91 1054	USA Forest Service	Bean Ridge Creek	------	Stock Watering
91 1053	USA Forest Service	Bush Spring	.0110	Stock Watering
91 1047	USA Forest Service	Tributary to French Creek	------	Stock Watering
91 1048	USA Forest Service	Tributary to French Creek	------	Stock Watering
91 1051	USA Forest Service	Anderson Creek	------	Stock Watering
91 1041	USA Forest Service	Andrew Dairy Creek	------	Stock Watering
91 1042	USA Forest Service	East Fork Dairy Creek	------	Stock Watering
91 3915	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 1040	USA Forest Service	East Fork Dairy Creek	------	Stock Watering
91 1044	USA Forest Service	Wife Creek	------	Stock Watering
91 1043	USA Forest Service	Wife Creek	------	Stock Watering
91 3917	Allred, D. Euray	Unnamed Spring	.0110	Domestic Stock Watering
91 3916	Allred, D. Euray	Unnamed Spring	.0110	Domestic Stock Watering
91 1048	USA Forest Service	Tributary to French Creek	------	Stock Watering
91 2288	Simonsen, Elrie & Bertha	Unnamed Spring	.0110	

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 1046	USA Forest Service	Horn Spring	.0150	Stock Watering
91 3949	Peterson, Lionel L.	Mill Creek	------	Stock Watering
91 3949	Peterson, Lionel L.	Mill Creek	------	Stock Watering
91 3950	Peterson, Lionel L.	Gooseberry Creek	------	
91 3950	Peterson, Lionel L.	Gooseberry Creek	------	
91 1113	USA Forest Service	Mill Creek	------	Stock Watering
91 1112	USA Forest Service	Mill Creek	------	
91 3951	Peterson, Lionel L.	Gooseberry Creek	------	
91 3951	Peterson, Lionel L.	Gooseberry Creek	------	
91 3960	Peterson, Lionel L.	Spring	.0220	
91 3961	Peterson, Lionel L.	Spring	.0220	
91 3962	Peterson, Lionel L.	Spring	.0220	
91 3963	Peterson, Lionel L.	Spring	.0220	
91 3967	Peterson, Lionel L.	Spring	.0220	
91 3968	Peterson, Lionel L.	Spring	.0220	
91 1114	USA Forest Service	Tributary to Mill Creek	------	Stock Watering
91 1114	USA Forest Service	Tributary to Mill Creek	------	Stock Watering
91 1049	USA Forest Service	French Creek	------	Stock Watering
91 1050	USA Forest Service	French Creek	------	Stock Watering
91 4348	USA Forest Service	Unnamed Spring	.0150	Stock Watering
91 1045	USA Forest Service	Antler Spring	.0150	Stock Watering
91 1047	USA Forest Service	Tributary to French Creek	------	Stock Watering
91 2494	Simonsen, Elrie & Bertha	Mooney Mine Spring	------	Irrigation Stock Watering
91 4322	USA Forest Service	Woods Canyon Pond	------	Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 482	Radakovich, Robert	Unnamed Spring	------	Stock Watering
91 475	Marakis, John	Unnamed Spring	.0110	
91 435	Marakis, Nick	Unnamed Spring	.0110	
91 1148	Nicolaides, Tom & Leon Daraban, Mary Stathis & Bessie	Green Canyon Stream	------	Stock Watering
91 1148	Nicolaides, Tom & Leon Daraban, Mary Stathis & Bessie	Green Canyon Stream	------	Stock Watering
91 474	Marakis, John	Unnamed Spring	.0110	
91 434	Marakis, Nick	Unnamed Spring	.0110	
91 3969	Fasselin, Caroline	Unnamed Spring	.0220	Domestic Stock Watering
91 3970	Fasselin, Caroline	Unnamed Spring	.0220	Domestic Stock Watering
91 3875	Frandsen, G. Pete	Stream	------	Stock Watering
91 3577	Frandsen, Pete	Unnamed Stream	.0110	
91 3637	Frandsen, Pete	Dairy Creek	------	
91 3572	Frandsen, Pete	Unnamed Spring	.0110	
91 3571	Frandsen, Pete	Unnamed Spring	.0110	
91 3044	Frandsen, Pete	Unnamed Spring	.0110	
91 3875	Frandsen, G. Pete	Stream	------	Stock Watering
91 3576	Frandsen, Pete	Unnamed Spring	.0110	
91 3575	Frandsen, Pete	Unnamed Spring	.0110	
91 4229	Scofield Mtn. Home Rec. Assoc.	Three Springs	------	Domestic
91 3570	Frandsen, Pete	Unnamed Spring	.0110	

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 3043	Frandsen, Pete	Unnamed Spring	.0110	
91 4229	Scofield Mtn. Home Rec. Assoc.	Three Springs	------	Domestic
E1483	Scofield Mtn. Home Rec. Assoc.	Three Springs	------	Domestic
91 4229	Scofield Mtn. Home Rec. Assoc.	Three Springs	------	Domestic
91 3573	Frandsen, G. Pete	Unnamed Spring	.0880	Irrigation
91 3042	Scofield Mtn. Home Rec. Assoc.	Unnamed Springs	.0110	Domestic
91 3042	Scofield Mtn. Home Rec. Assoc.	Unnamed Springs	.0110	Domestic
91 3042	Scofield Mtn. Home Rec. Assoc.	Unnamed Springs	.0110	Domestic
91 2	Price River Water Users Assoc.	Gooseberry Creek	------	Multiple Uses
E375	Scofield Mtn. Home Rec. Assoc.	Spring	------	Domestic
91 3632	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3574	Frandsen, G. Pete	Unnamed Spring	.0110	
91 3163	Frandsen, Pete	Unnamed Spring	.0110	
91 3641	Frandsen, Pete	Unnamed Stream	------	
91 3642	Jones, Bill B. & Utahna Pace	Unnamed Spring	.0110	
91 3920	Allred, D. Euray	Unnamed Spring	.0110	Domestic Stock Watering
91 3658	Jones, Bill B. & Utahna Pace	Unnamed Stream	------	
91 3631	Allred, D. Euray	Woods Canyon Creek	------	Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 2495	Simonsen, Elrie & Bertha	Woods Canyon Creek	------	
91 3922	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3405	Simonsen, Elrie & Bertha	Woods Canyon Creek	.5000	Irrigation Stock Watering

SURFACE WATER RIGHTS
LOCATED WITHIN OR ADJACENT TO WINTER QUARTERS CANYON

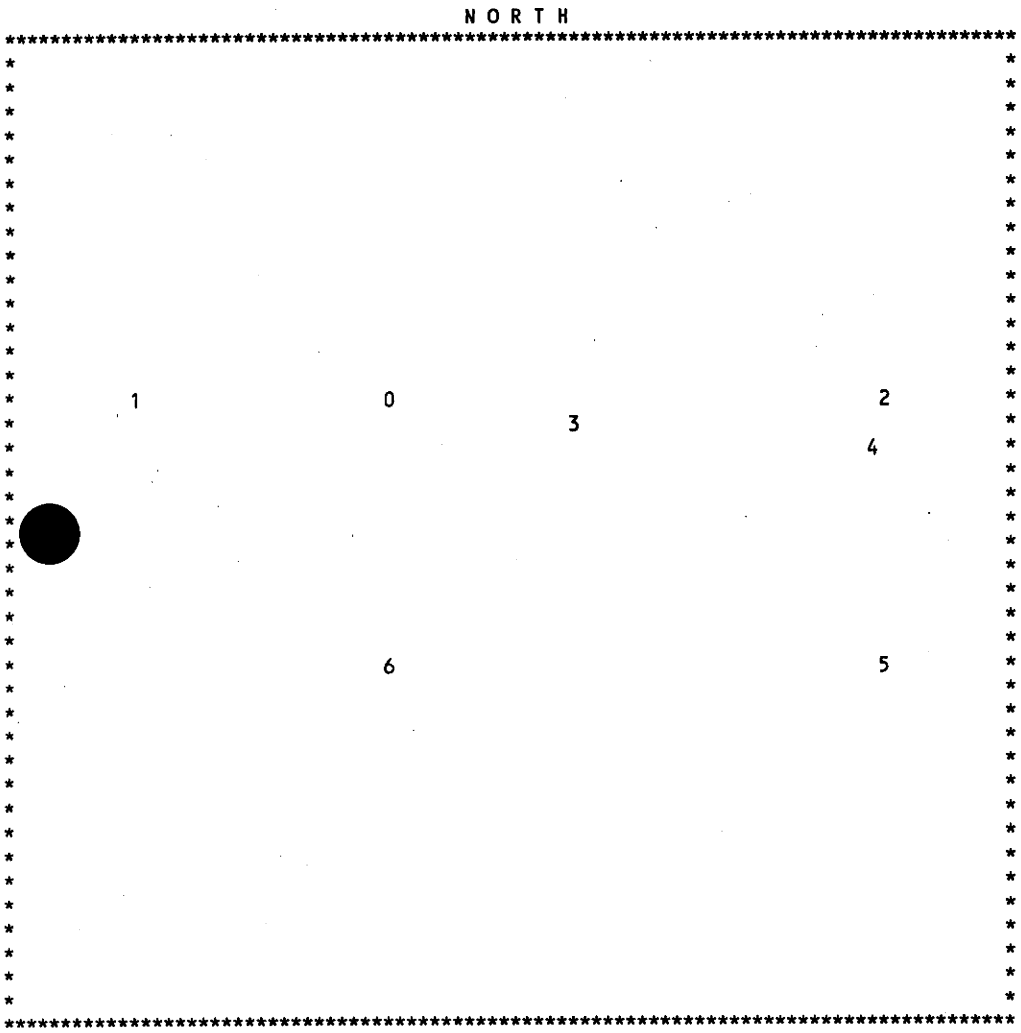
Water Use Claim No.	Owner	Source	Flow (cfs)	Purpose or Use
91 3638	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3631	Allred, D. Euray	Woods Canyon Creek	------	Stock Watering
91 1038	USA Forest Service	Woods Canyon Creek	------	Stock Watering
91 3918	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3634	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3919	Allred, D. Euray	Unnamed Spring	.0110	Stock Watering
91 3010	Jensen, Fred & Shelia	Winter Quarters Creek	.2130	Irrigation
91 3009	Simonsen, Elrie M. & Bertha	Winter Quarters Creek	.0680	Irrigation
91 3007	Simonsen, Elrie M. & Bertha	Winter Quarters Creek	.6300	Irrigation
91 483	Radakovich, Robert	Winter Quarters Creek	.4430	Irrigation Stock Watering
91 462	Eureka Energy Company	Winter Quarters Creek	------	
91 423	Marakis, Nick	Winter Quarters Creek	------	
91 462	Eureka Energy Company	Winter Quarters Creek	------	
91 2144	Simonsen, Elrie M. & Bertha	Simonsen Spring	.0220	Domestic
91 2145	Radakovich, Robert	Simonsen Spring	.0220	Domestic
91 464	Eureka Energy Company	Unnamed Spring	.0220	
91 425	Marakis, Nick	Unnamed Spring	.0220	
91 455	Radakovich, Robert	Unnamed Spring	.0110	Stock Watering
91 481	Radakovich, Robert	Unnamed Spring	.0110	Stock Watering
91 2669	Simonsen, H.B. & Della	Unnamed Spring	.0110	Stock Watering
91 482	Radakovich, Robert	Unnamed Spring	------	Stock Watering

D

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, JUN 16, 1992, 10:41 AM
PLOT SHOWS LOCATION OF 10 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 1 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



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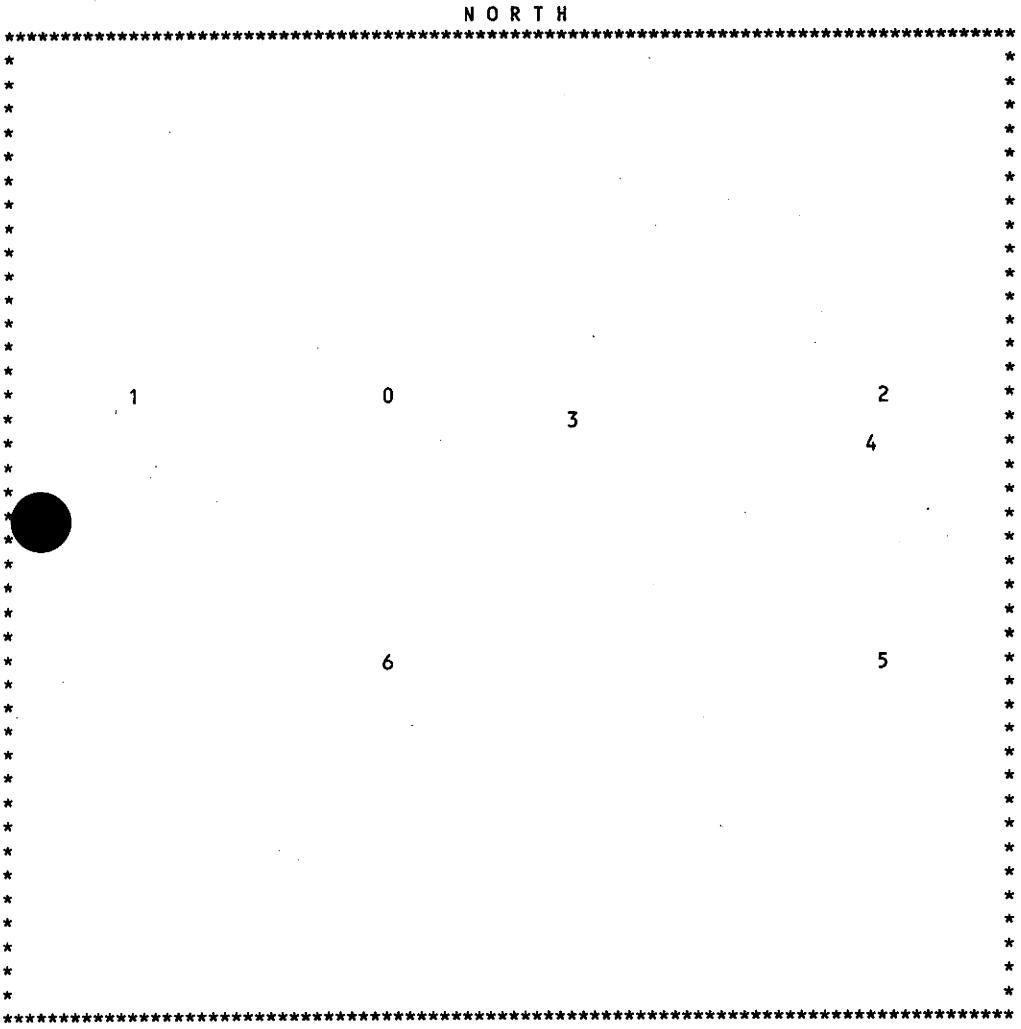
UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, JUN 16, 1992, 10:41 AM
PLOT SHOWS LOCATION OF 10 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 1 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PRT	RED
0	91 3635	.0000	.00	Unnamed Stream												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	Allred, D. Euray													Fountain Green					UT	84632	
0	91 3635	.0000	.00	Unnamed Stream												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	Allred, D. Euray													Fountain Green					UT	84632	
1	91 3633	.0000	.00	Winter Quarters Creek												X		X		X	
	WATER USE(S):													PRIORITY DATE: 00/00/1860							
	Allred, D.Euray													Fountain Green					UT	84632	
2	91 3633	.0000	.00	Winter Quarters Creek												X		X		X	
	WATER USE(S):													PRIORITY DATE: 00/00/1860							
	Allred, D.Euray													Fountain Green					UT	84632	
3	E1934	.0000	20.00	Underground Water Well			S 2000	W 2300	NE	1	13S	6E	SL			X			X		
	WATER USE(S): OTHER													PRIORITY DATE: 06/29/1981							
	UCO, Incorporated			1580 Lincoln Suite 530										Denver					UT	80203	
4	E1934	.0000	20.00	Underground Water Well			S 2200	W 700	NE	1	13S	6E	SL			X			X		
	WATER USE(S): OTHER													PRIORITY DATE: 06/29/1981							
	UCO, Incorporated			1580 Lincoln Suite 530										Denver					UT	80203	
5	91 463	.0110	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1902							
	Eureka Energy			215 Market Street										San Francisco					CA	94106	
5	91 424	.0110	.00	Unnamed Spring												X		X		X	
	WATER USE(S):													PRIORITY DATE: 00/00/1902							
	Marakis, Nick			165 E. 100 S.										Price					UT		
6	91 471	.0000	.00	Unnamed Stream												X		X		X	
	WATER USE(S):													PRIORITY DATE: 00/00/1860							
	Marakis, John			165 East 1st South										Price					UT	84501	
6	91 431	.0000	.00	Unnamed Stream												X		X		X	
	WATER USE(S):													PRIORITY DATE: 00/00/1860							
	Marakis, Nick			166 East 1st South										Price					UT	84501	

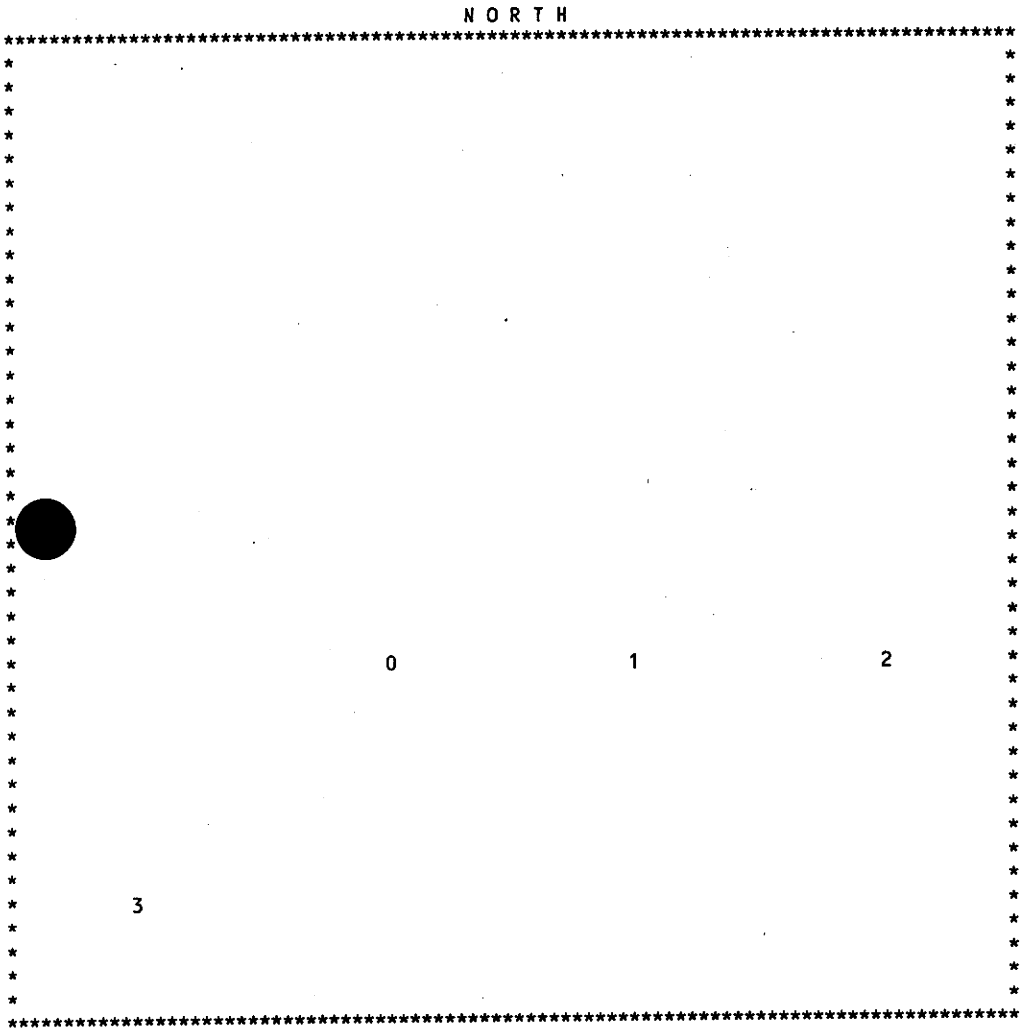
Sec 1 T13S R6E

C

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, JUN 16, 1992, 10:42 AM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 2 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

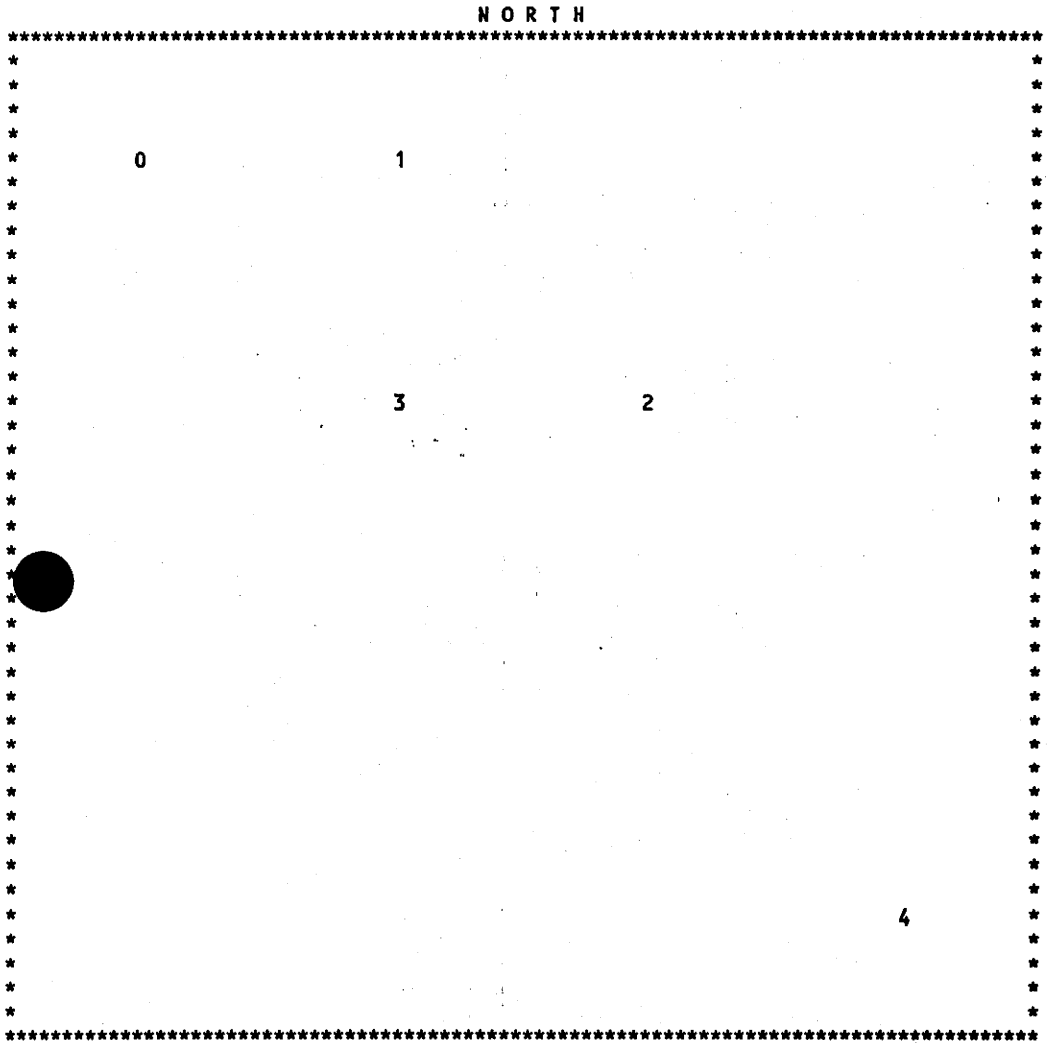
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUBJECT TO	UNAPPROPRIATED	PROTEST	RECEIVED
0	91 1029	.0000	.00	Trib to Winter Quarters Canyon											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	USA Forest Service				324-25th Street				Ogden				UT	84401						
1	91 1037	.0000	.00	Bob's Canyon Creek											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	USA Forest Service				324-25th Street				Ogden				UT	84401						
2	91 1033	.0000	.00	Winter Quarters Canyon Creek											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	USA Forest Service				324-25th Street				Ogden				UT	84401						
3	91 1034	.0000	.00	Trib. to Winter Quarters Canyo											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	USA Forest Service				324-25th Street				Ogden				UT	84401						

Sec 2 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:31 PM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 3 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

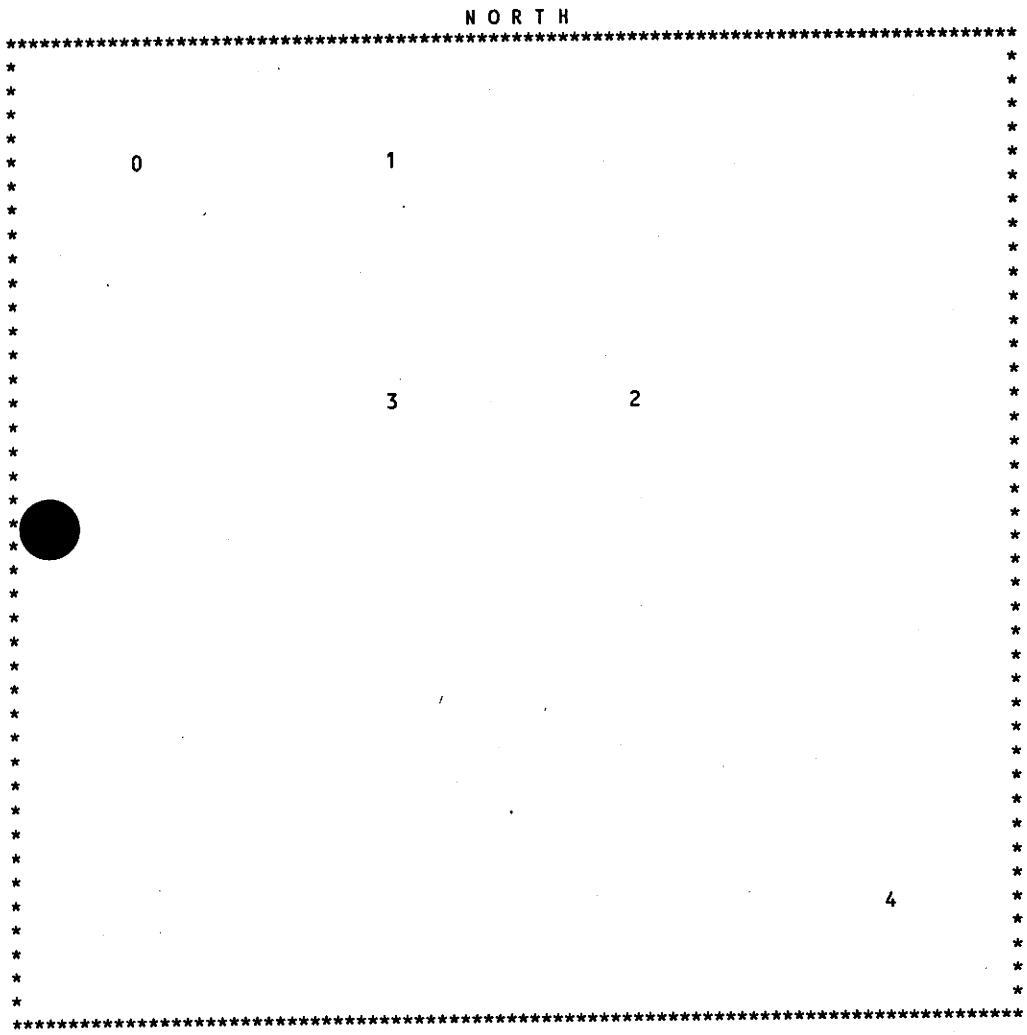
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNN	APP	TER	SUR	UGW	PRT	RED
0	91 1036	.0150	.00	Unnamed Spring									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
0	91 1038	.0000	.00	Woods Canyon Creek									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
1	91 1037	.0000	.00	Trib. to Winter Quarters Canyo									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
2	91 1034	.0000	.00	Trib. to Winter Quarters Canyo									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
3	91 1035	.0150	.00	Unnamed Spring									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
4	91 4361	.0000	.00	Trib. of Winter Quarters Cyn.									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
4	91 1031	.0000	.00	Trib to Winter Quarters Canyon									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
4	91 1032	.0000	.00	Trib to Winter Quarters Canyon									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							

B

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, JUN 16, 1992, 10:42 AM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 3 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

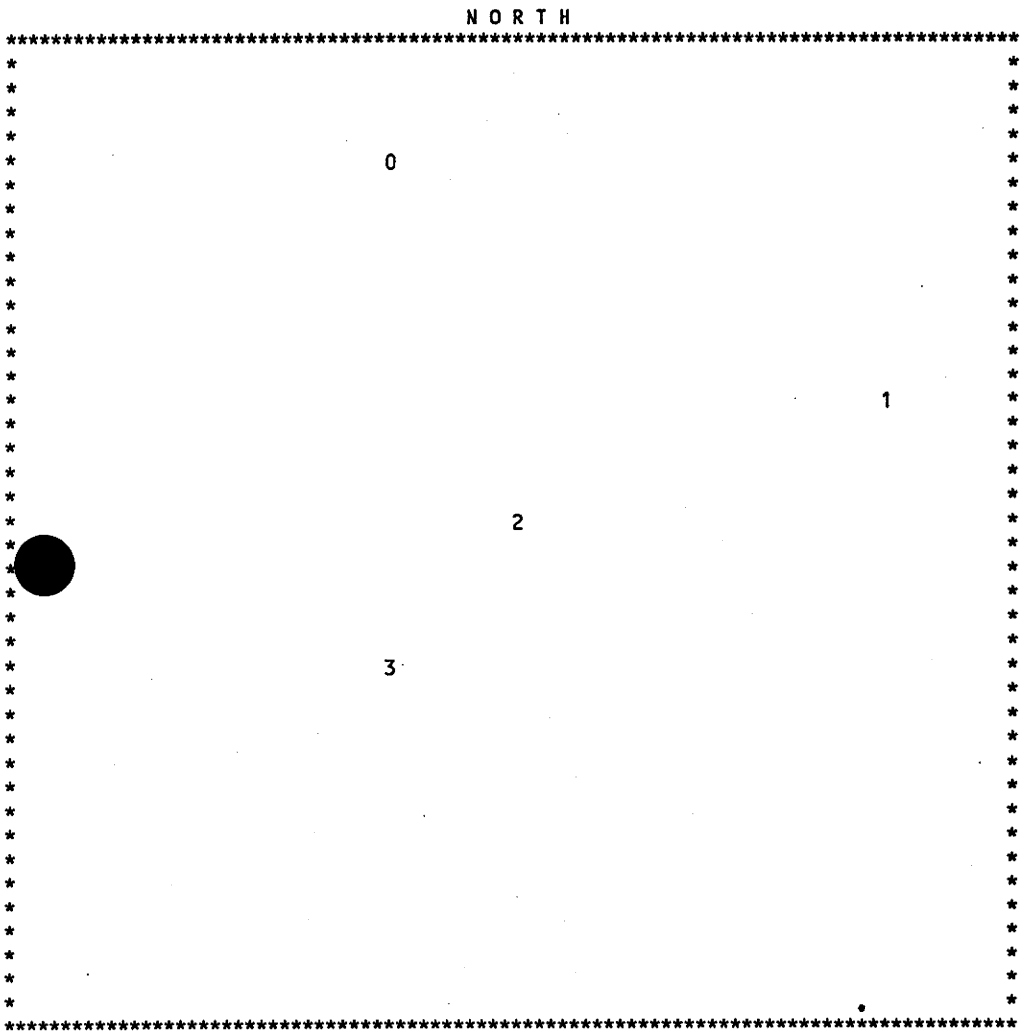
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNNP	APPR	TERR	SURR	UGRW	PTPD	RED
0	91 1036	.0150	.00	Tone Spring										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
0	91 1038	.0000	.00	Woods Canyon Creek										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
1	91 1037	.0000	.00	Bob's Canyon Creek										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
2	91 1034	.0000	.00	Trib. to Winter Quarters Canyo										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
3	91 1035	.0150	.00	Rock Spring										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
4	91 4361	.0000	.00	Trib. of Winter Quarters Cyn.										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden			UT	84401					
4	91 1031	.0000	.00	Trib to Winter Quarters Canyon										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					
4	91 1032	.0000	.00	Trib to Winter Quarters Canyon										X	X	X		
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden			UT	84401					

E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:31 PM
PLOT SHOWS LOCATION OF 6 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 4 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

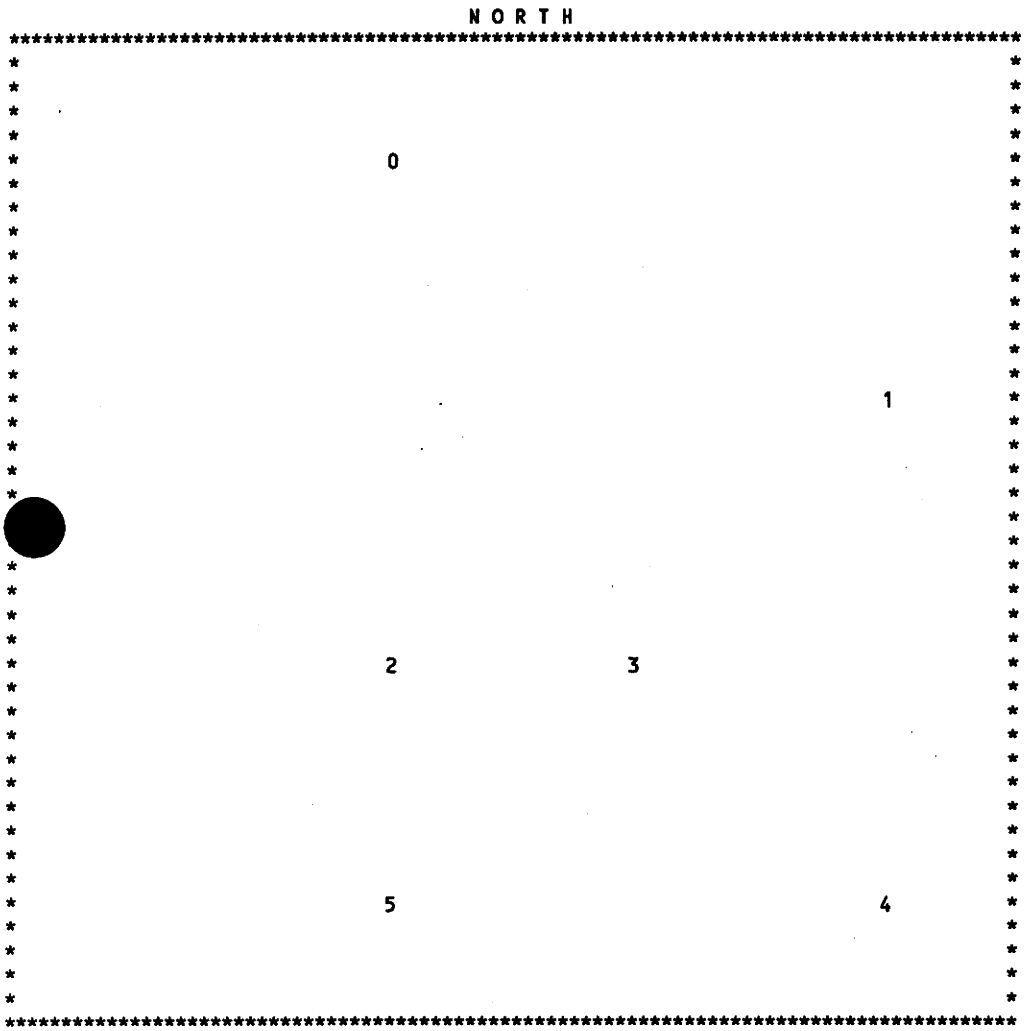
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNP	APP	TER	SUR	UGW	PTP	RED
0	91 1112	.0000	.00	Mill Creek										X		X		X
	WATER USE(S):								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
1	91 1033	.0000	.00	Winter Quarters Canyon Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
2	91 1113	.0000	.00	Mill Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324-25th Street				Ogden		UT 84401							
2	91 4323	.0000	.10	Pipeline Pond										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Odgen		UT 84401							
2	93 1	.0000	.00	Kitchen Fork of Huntington Cre										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
3	93 2	.0000	.00	Kitchen Fork of Huntington Cre										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							

Sec 4 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:22 PM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 5 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

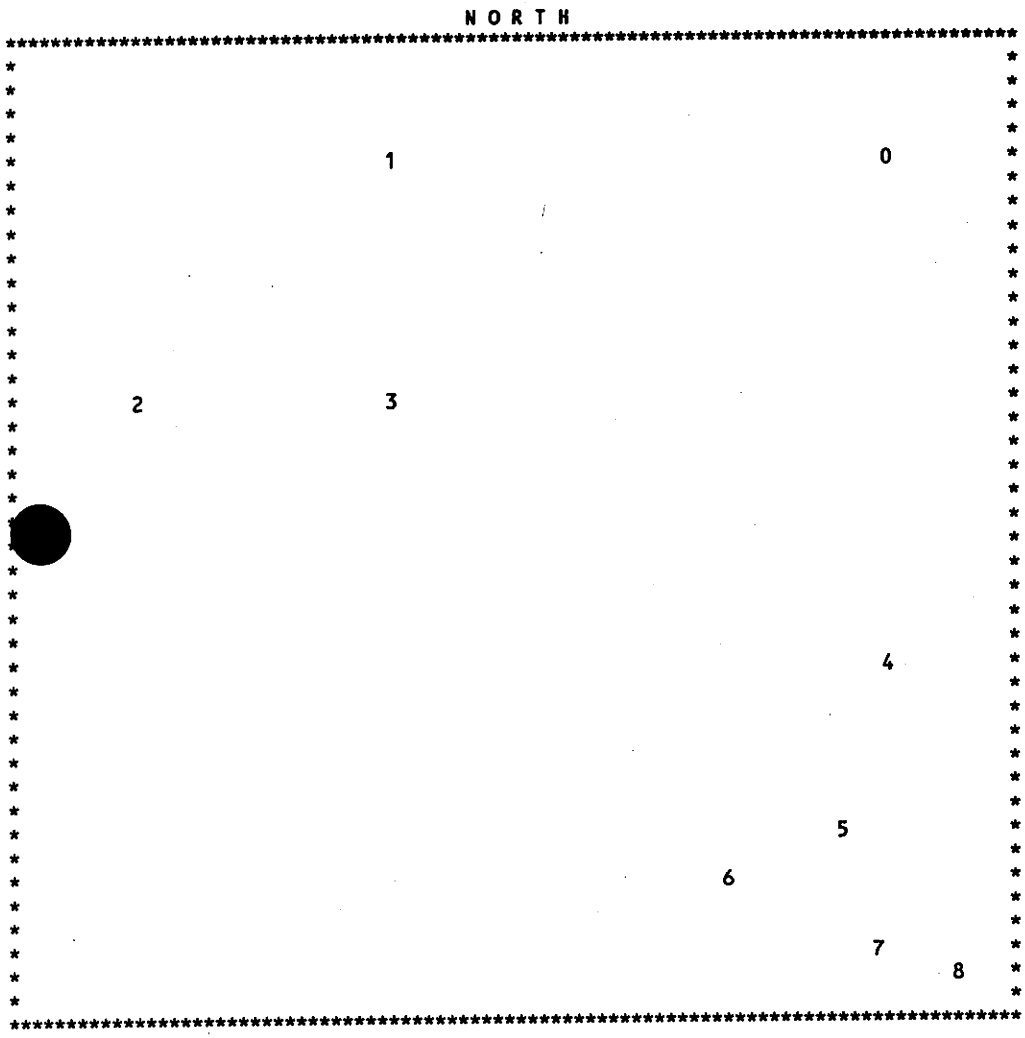
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PTP	RED
0	91 3971	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
1	91 3985	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
2	91 3974	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
2	91 3973	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
3	91 3975	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
4	91 3976	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
5	91 3977	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								
5	91 3978	.0220	.00	Spring												X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860												
													UT								

Sec 5 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:23 PM
PLOT SHOWS LOCATION OF 85 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 8 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNP	APPR	TERR	SURR	UGRW	PRTD
0	91 3980	.0220	.00	Spring											X		X		X
	WATER USE(S):										PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.												UT						
1	91 3979	.0220	.00	Spring											X		X		X
	WATER USE(S):										PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.												UT						
2	91 3982	.0220	.00	Spring											X		X		X
	WATER USE(S):										PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.												UT						
3	91 3981	.0220	.00	Spring											X		X		X
	WATER USE(S):										PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.												UT						
4	91 3983	.0220	.00	Spring											X		X		X
	WATER USE(S):										PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.												UT						
5	91 4073	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4075	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4067	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4078	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 Eat 3365 South						Salt Lake City		UT	84101					
5	91 4070	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4077	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4069	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4079	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4076	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4072	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					
5	91 4080	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT	84101					

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UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNP	APPR	TEER	SURR	UGWP	PRTD
5	91 4064	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprise Inc.l)				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4071	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4068	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4074	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4066	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4081	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4082	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
5	91 4065	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84109						
5	91 4083	.0000	8.84	12 Unnamed Springs			N 1040	W 915	NE	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4073	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4075	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4067	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4078	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 Eat 3365 South						Salt Lake City		UT 84101						
6	91 4070	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4077	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101						
6	91 4069	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84101						

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UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
6	91 4079	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4076	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4072	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4080	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4064	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.l)				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4071	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4068	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4074	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4066	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4081	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4082	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
6	91 4065	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84109								
6	91 4083	.0000	8.84	12 Unnamed Springs			N 790	W 1520	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
7	91 4073	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
7	91 4075	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
7	91 4067	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								

58 T13S R6E

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APP	TER	SER	UGR	PWR	RTD
7	91 4078	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 Eat 3365 South					Salt Lake City			UT 84101							
7	91 4070	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4077	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4069	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4079	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4076	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4072	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4080	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4064	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.l)				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4071	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4068	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4074	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4066	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4081	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4082	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
7	91 4065	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South					Salt Lake City			UT 84109							

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UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	TER	SER	UUR	GRW	TWP	RED
7	91 4083	.0000	8.84	12 Unnamed Springs			N 425	W 755	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4073	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4075	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4067	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4078	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 Eat 3365 South						Salt Lake City		UT 84101								
8	91 4070	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4077	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4069	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4079	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4076	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4072	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4080	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4064	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.l)				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4071	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4068	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
8	91 4074	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								

S8T13S R6E

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	TER	SUR	UGW	PTP	RED
8	91 4066	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
8	91 4081	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
8	91 4082	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
8	91 4065	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.				2878 East 3365 South				Salt Lake City				UT 84109							
8	91 4083	.0000	8.84	12 Unnamed Springs			N 320	W 322	SE	8	13S	6E	SL			X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							

S8T13S R6E

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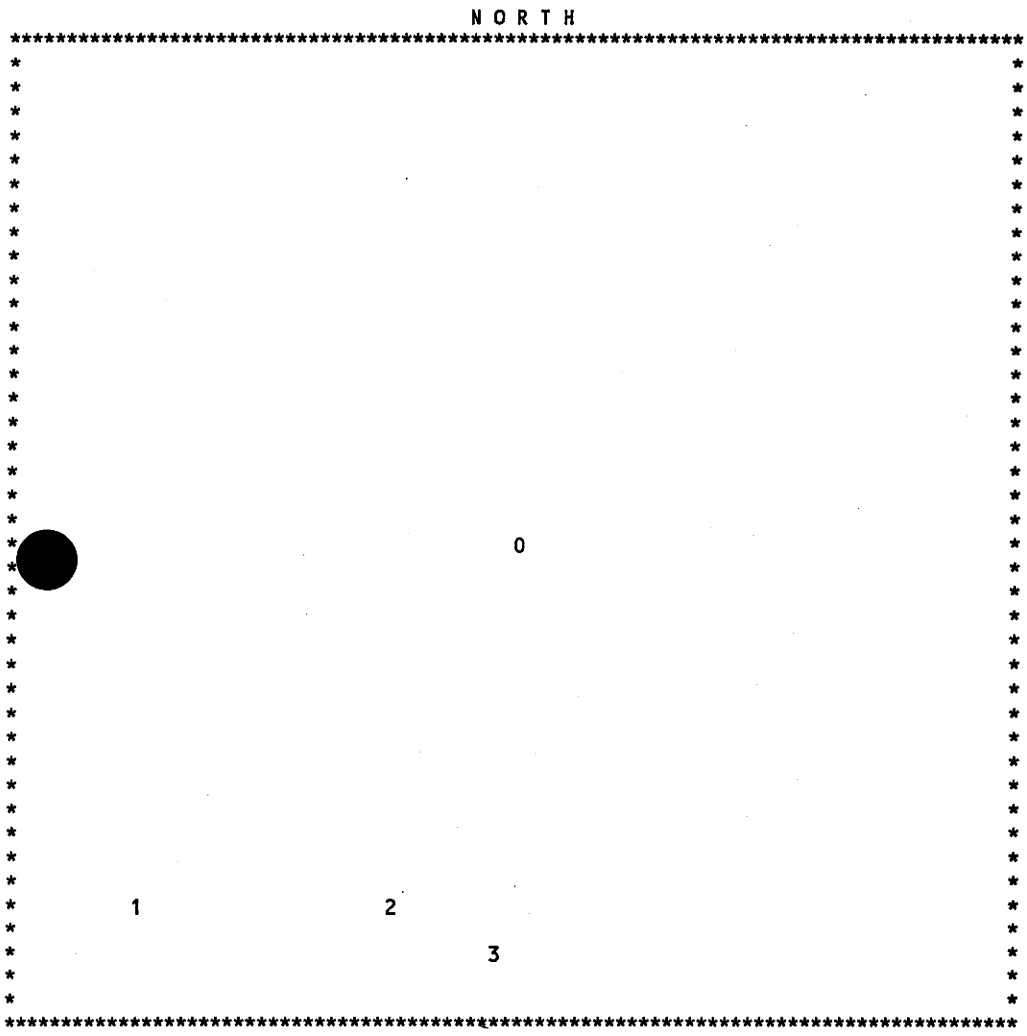
UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:32 PM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 9 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNP	APR	TER	SUR	UGW	PTP	RED
0 93	3	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
0 93	3	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
0 93	2	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
0 93	1	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
1 93	232	.0110	.00	Brooks Canyon Divide Spring Nu									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1902									
	Crowther, Osmond and Idena J.								Fountain Green		UT 84632							
2 93	433	.0110	.00	Unnamed Spring									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	Allen, Lloyd J.				2878 East 3365 South				Salt Lake City		UT 84101							
2 93	434	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	Blood, David B.										UT							
3 93	434	.0000	.00	Kitchen Fork of Huntington Cre									X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875									
	Blood, David B.										UT							

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:33 PM
PLOT SHOWS LOCATION OF 6 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 10 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET

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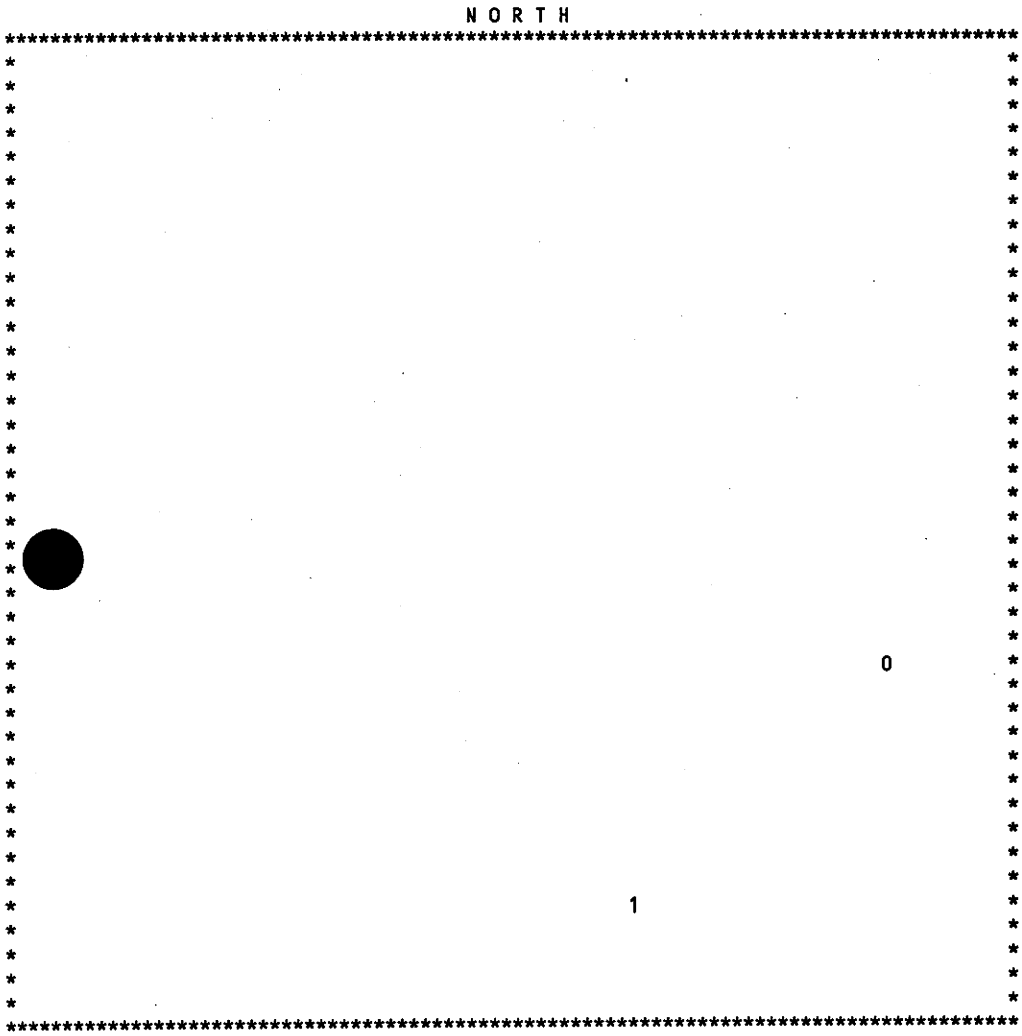
UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APR	PER	TER	SUR	UGW	PWP	RED
0	91 4361	.0000	.00	Trib. of Winter Quarters Cyn.												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	USA Forest Service				324 25th Street									Ogden					UT	84401	
0	91 1032	.0000	.00	Trib to Winter Quarters Canyon												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	USA Forest Service				324-25th Street									Ogden					UT	84401	
1	93 5	.0110	.00	North Huntington Spring												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1875							
	USA Forest Service				324 25th Street									Ogden					UT	84401	
1	93 6	.0000	.00	North Fork Huntington Creek												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1875							
	USA Forest Service				324 25th Street									Ogden					UT	84401	
2	91 1031	.0000	.00	Trib to Winter Quarters Canyon												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	USA Forest Service				324-25th Street									Ogden					UT	84401	
3	93 1006	40.0000	10000.00	Tribs.of North Fork of Hunting			N	380	E	2010	SW	10	13S	6E	SL	X			X		
	WATER USE(S): IRRIGATION													PRIORITY DATE: 09/06/1941							
	USA Bureau of Reclamation				125 South State Street									Salt Lake City					UT	84111	

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:33 PM
PLOT SHOWS LOCATION OF 2 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 11 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

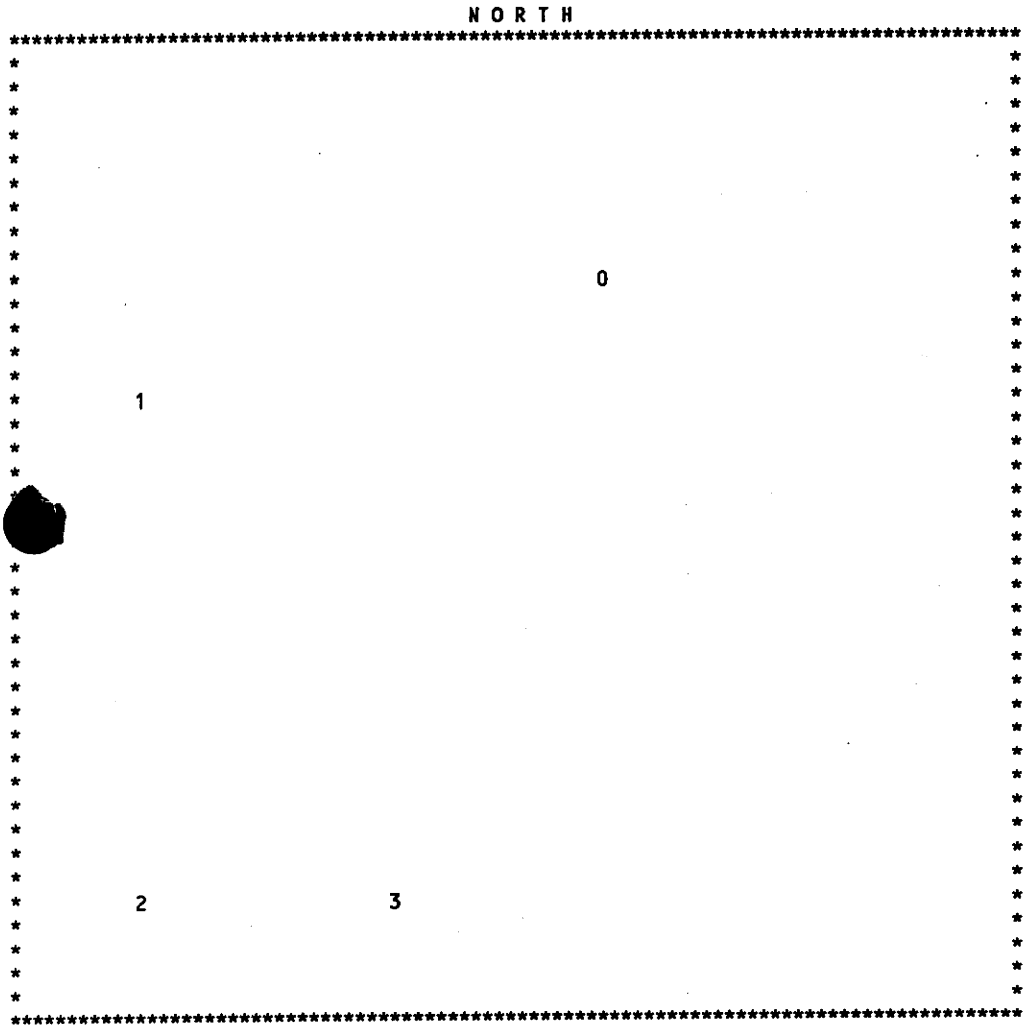
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR	QUANTITY AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PWP	RED
0	91 463	.0110		.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING											PRIORITY DATE: 00/00/1902										
	Eureka Energy					215 Market Street						San Francisco			CA 94106							
1	91 1030	.0000		.00	Trib to Winter Quarters Canyon												X		X		X	
	WATER USE(S): STOCKWATERING											PRIORITY DATE: 00/00/1860										
	USA Forest Service					324-25th Street						Ogden			UT 84401							

511 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:27 PM
PLOT SHOWS LOCATION OF 7 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 12 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

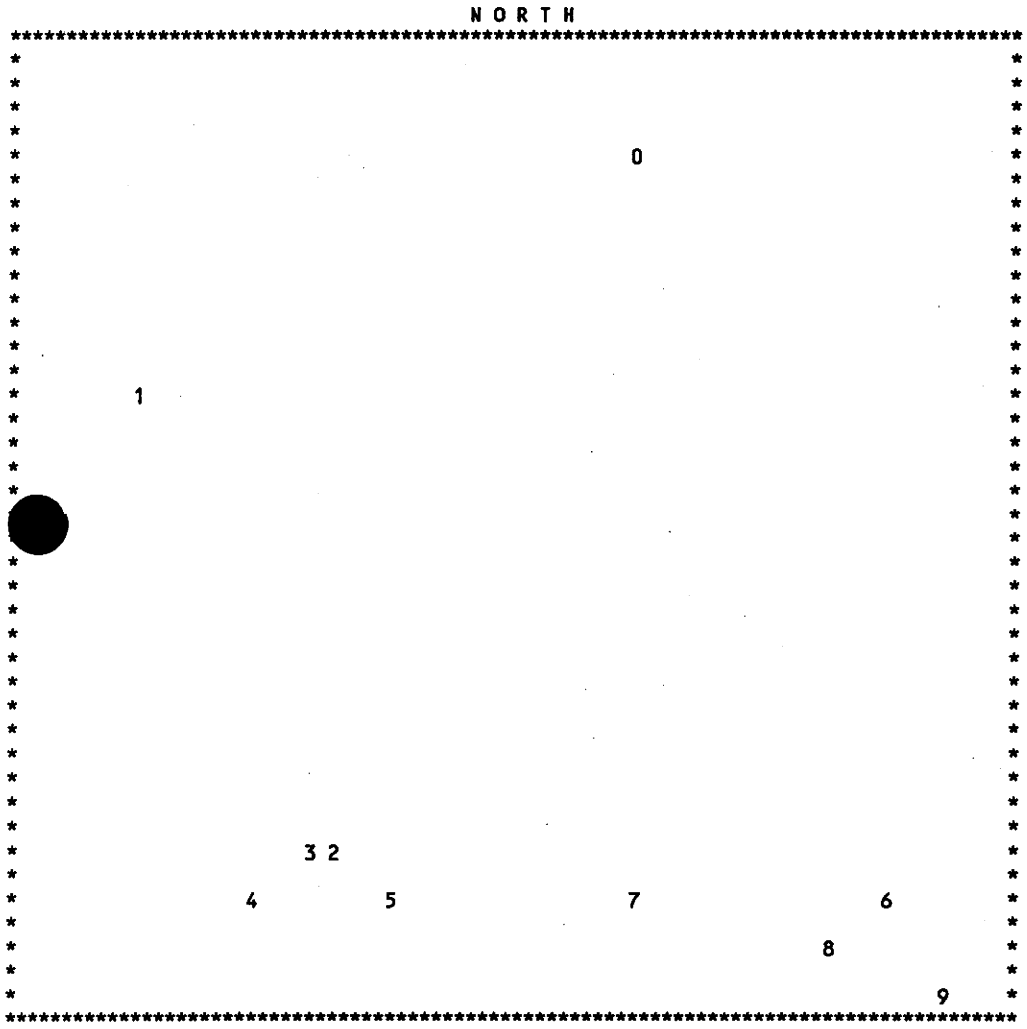
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
0	E1934	.0000	20.00	Underground Water Well			S 1300	W 2200	NE	12	13S	6E	SL		X				X		
	WATER USE(S): OTHER								PRIORITY DATE: 06/29/1981												
	UCO, Incorporated			1580 Lincoln Suite 530					Denver				UT 80203								
1	91 471	.0000	.00	Unnamed Stream											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, John			165 East 1st South					Price				UT 84501								
1	91 431	.0000	.00	Unnamed Stream											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, Nick			166 East 1st South					Price				UT 84501								
2	91 476	.0000	.00	Unnamed Stream											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, John			165 East 1st South					Price				UT 84501								
2	91 436	.0000	.00	Unnamed Stream											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, Nick			165 East 1st South					Price				UT 84501								
3	91 432	.0110	.00	Unnamed Spring											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, Nick			165 East 1st South					Price				UT 84501								
3	91 472	.0110	.00	Unnamed Spring											X		X		X		
	WATER USE(S):								PRIORITY DATE: 00/00/1860												
	Marakis, John			165 East 1st South					Price				UT 84501								

S12 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:21 PM
PLOT SHOWS LOCATION OF 13 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 13 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNPR	APPR	PTER	SURD	UGWR	PTED
0	91 433	.0110	.00	Unnamed Spring											X		X		X
	WATER USE(S):																		
	Marakis, Nick				675 East 1st South														
0	91 473	.0110	.00	Unnamed Spring											X		X		X
	WATER USE(S):																		
	Marakis, John				165 East 1st South														
1	91 4345	.0150	.00	Unnamed Spring											X		X		X
	WATER USE(S): STOCKWATERING																		
	USA Forest Service				324 25th Street														
2	E1114	.0000	30.00	Underground Water Well			N 900	E 1700	SW	13	13S	6E	SL		X		X		
	WATER USE(S): OTHER																		
	Coastal States Energy Co.,				Coastal Tower, Nine Greenway Plaza,														
3	E1560	.0000	118.00	8	500 - 1000		N 850	E 1600	SW	13	13S	6E	SL		X			X	
	WATER USE(S): MINING																		
	Coastal States Energy Company				Nine Greenway Plaza														
4	E1114	.0000	30.00	8	100 - 300		N 700	E 1300	SW	13	13S	6E	SL		X			X	
	WATER USE(S): OTHER																		
	Coastal States Energy Co.,				Coastal Tower, Nine Greenway Plaza,														
5	91 1025	.0000	.00	Trib to Eccles Canyon Creek											X		X		X
	WATER USE(S): STOCKWATERING																		
	USA Forest Service				324-25th Street														
6	91 1028	.0000	.00	Eccles Canyon Creek											X		X		X
	WATER USE(S): STOCKWATERING																		
	USA Forest Service				324-25th Street														
6	91 1027	.0000	.00	Eccles Canyon Creek											X		X		X
	WATER USE(S): STOCKWATERING																		
	USA Forest Service				324-25th Street														
7	91 3070	.0000	.00	Eccles Canyon Creek											X		X		X
	WATER USE(S):																		
	Marakis, John				160 East 1st South														
7	91 3071	.0000	.00	Eccles Canyon Creek											X		X		X
	WATER USE(S):																		
	Marakis, Nick				789 East 8th North														
8	E1906	.0000	118.00			1981	N 350	E 4300	SW	13	13S	6E	SL		X			X	
	WATER USE(S): OTHER																		
	Coastal States Energy Company				Coastal Tower, Nine Greenway Plaza														
9	E1560	.0000	118.00	8	500 - 1000		N 175	W 375	SE	13	13S	6E	SL		X			X	
	WATER USE(S): MINING																		
	Coastal States Energy Company				Nine Greenway Plaza														

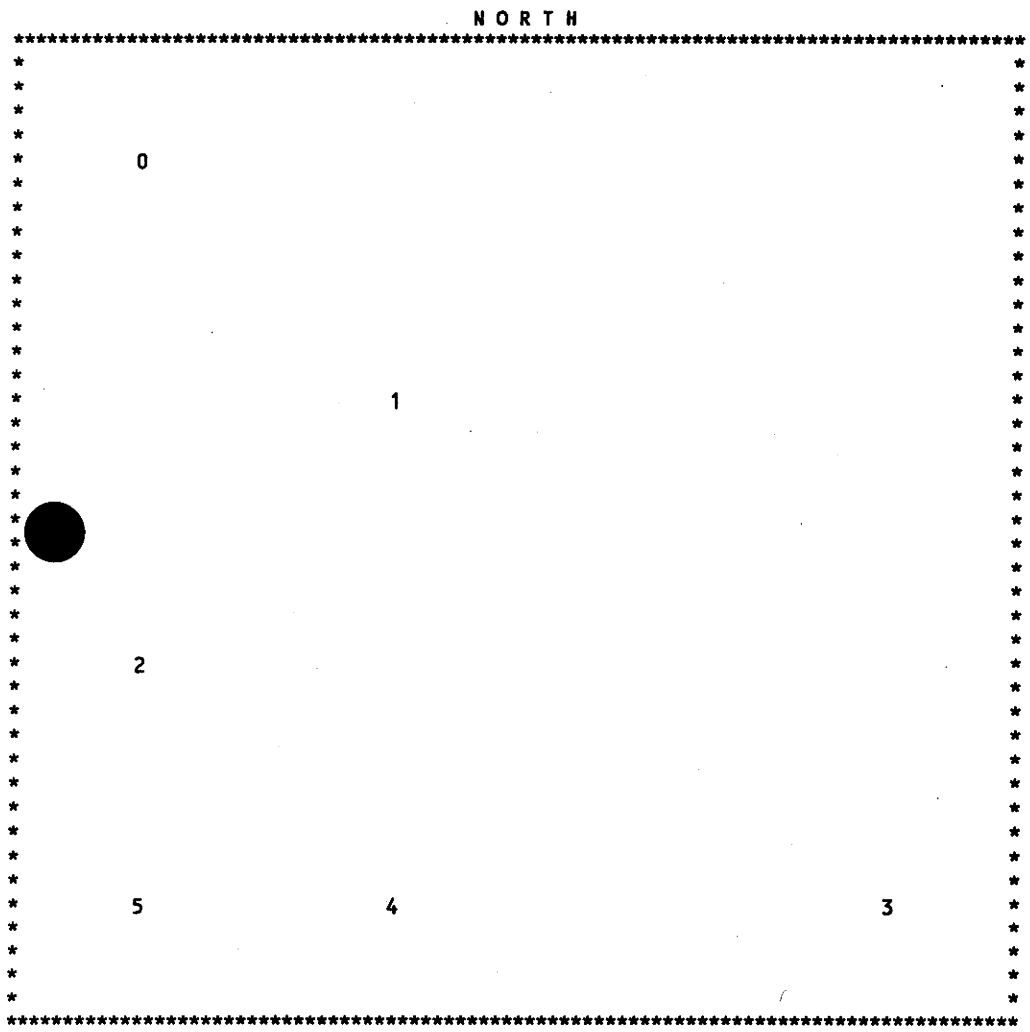
PRIORITY DATE: 00/00/1902 — Price UT 84501
PRIORITY DATE: 00/00/1902 — Price UT 84501
PRIORITY DATE: 00/00/1860 — Ogden UT 84401
PRIORITY DATE: 06/13/1977 — Huston TX 77046
PRIORITY DATE: 07/19/1979 — Houston TX 77046
PRIORITY DATE: 06/13/1977 — Huston TX 77046
PRIORITY DATE: 00/00/1860 — Ogden UT 84401
PRIORITY DATE: 00/00/1860 — Ogden UT 84401
PRIORITY DATE: 00/00/1860 — Ogden UT 84401
PRIORITY DATE: 00/00/1860 — Price UT 84501
PRIORITY DATE: 00/00/1860 — Price UT 84501
PRIORITY DATE: 05/28/1981 — Houston TX 77046
PRIORITY DATE: 07/19/1979 — Houston TX 77046

S13 T13 SR6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:21 PM
PLOT SHOWS LOCATION OF 7 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 14 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

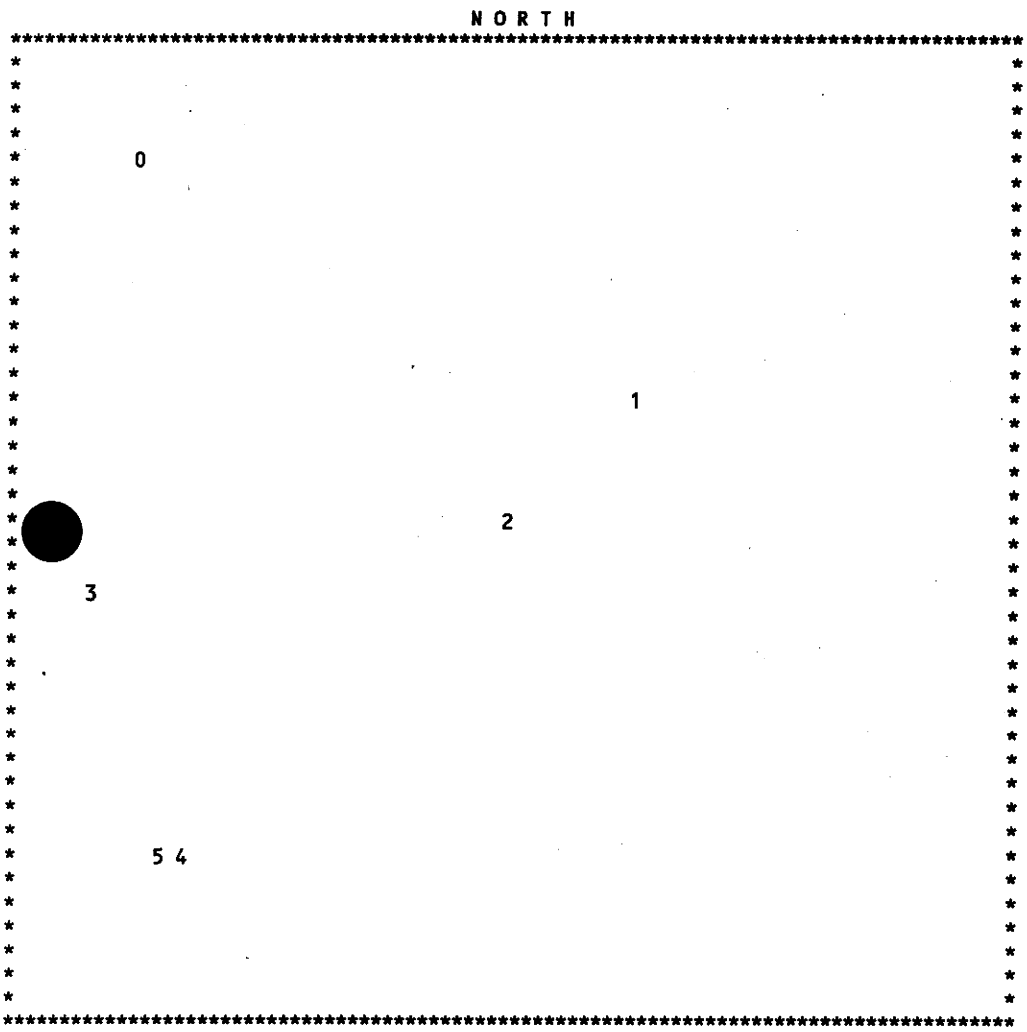
CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNP	APR	PER	TER	SUR	UGW	PTP	RED
0	91 1030	.0000	.00	Trib to Winter Quarters Canyon										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860										
	USA Forest Service				324-25th Street				Ogden		UT 84401								
1	91 1029	.0000	.00	Trib to Winter Quarters Canyon										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860										
	USA Forest Service				324-25th Street				Ogden		UT 84401								
2	93 1540	.0110	.00	Moss Pond Spring										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875										
	USA Forest Service				324 25th Street				Ogden		UT 84401								
3	91 1026	.0000	.00	Trib to Eccles Canyon Creek										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860										
	USA Forest Service				324-25th Street				Ogden		UT 84401								
4	91 1028	.0000	.00	Eccles Canyon Creek										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860										
	USA Forest Service				324-25th Street				Ogden		UT 84401								
4	91 1027	.0000	.00	Eccles Canyon Creek										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860										
	USA Forest Service				324-25th Street				Ogden		UT 84401								
5	93 1539	.0110	.00	Eccles Spring										X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875										
	USA Forest Service				324 25th Street				Ogden		UT 84401								

514 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:21 PM
PLOT SHOWS LOCATION OF 7 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 15 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

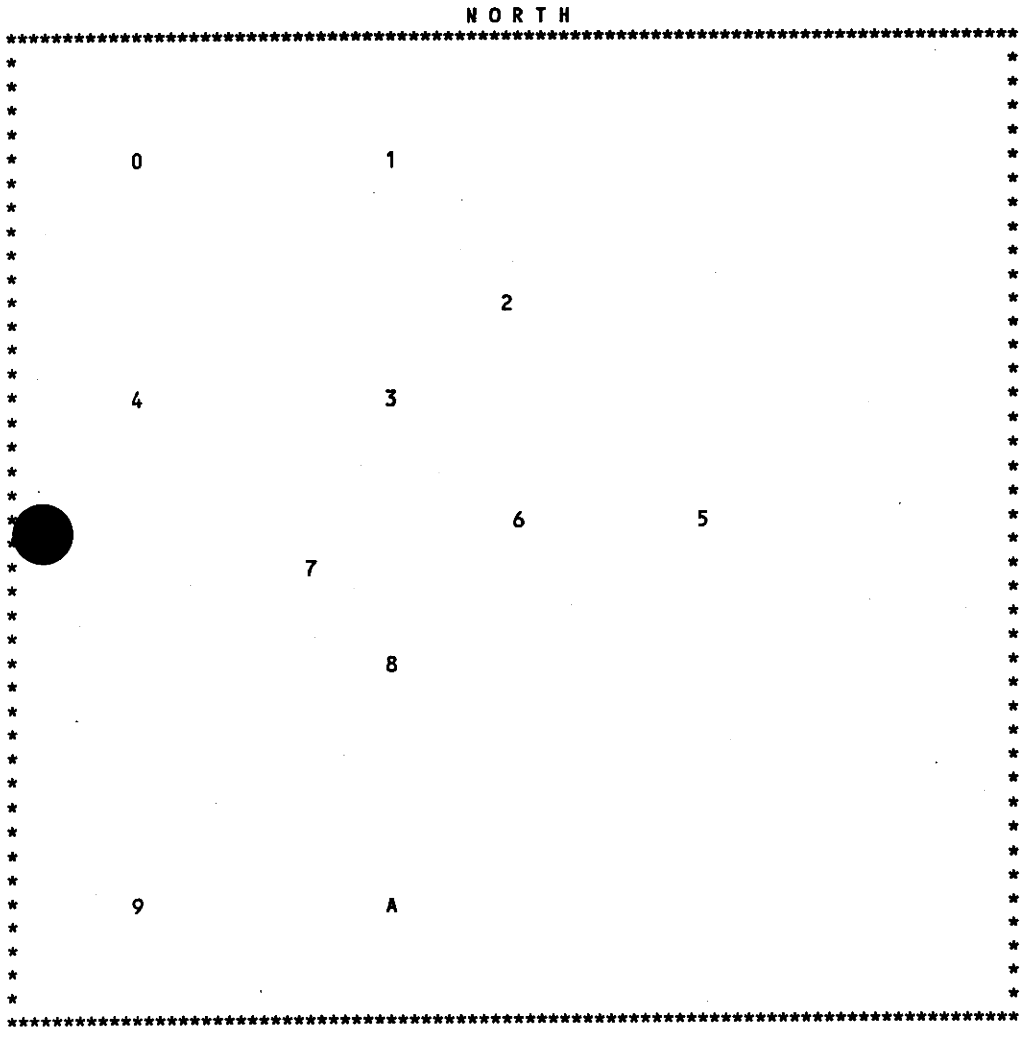
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNP	APP	TER	SUR	UGW	PRD
0	93 1541	.0110	.00	Eccles "A" Pond Spring									X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875								
	USA Forest Service				324 25th Street				Ogden			UT	84401				
1	93 3677	.0000	.00	Kitchen Spring									X		X		X
	WATER USE(S):																
	U.S. Forest Service											UT					
2	93 6	.0000	.00	North Fork Huntington Creek									X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1875								
	USA Forest Service				324 25th Street				Ogden			UT	84401				
3	93 1006	40.0000	10000.00	Tribs.of North Fork of Hunting			N 2350	E 400	SW 15	13S	6E SL	X			X		
	WATER USE(S): IRRIGATION								PRIORITY DATE: 09/06/1941								
	USA Bureau of Reclamation				125 South State Street				Salt Lake City			UT	84111				
4	91 4070	.0000	8.84	12 Unnamed Springs			N 890	E 8860	S4 17	13S	6E SL		X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT	84101				
5	91 4072	.0000	8.84	12 Unnamed Springs			N 890	E 8680	S4 17	13S	6E SL		X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT	84101				
5	91 4074	.0000	8.84	12 Unnamed Springs			N 890	E 8680	S4 17	13S	6E SL		X		X		
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860								
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT	84101				

S-15 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:19 PM
PLOT SHOWS LOCATION OF 18 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 16 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
0	93 435	.0110	.00	Unnamed Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Crowther Investment Company																				
1	93 432	.0110	.00	Brooks Canyon Divide Spring Nu														X		X	X
	WATER USE(S): STOCKWATERING																				
	Crowther Investment Company																				
2	E2536	.0000	.00	Unnamed Spring			N 3810	W 10	S4	16	13S	6E	SL		X				X		
	WATER USE(S): DOMESTIC																				
	Cowley, Stanley A. or Marie W.				P.O. Box 173																
3	93 279	.0110	.00	Unnamed Spring														X		X	X
	WATER USE(S): DOMESTIC STOCKWATERING																				
	Crowther Investment Company																				
4	93 449	.0110	.00	Unnamed Spring														X		X	X
	WATER USE(S): DOMESTIC STOCKWATERING																				
	Crowther Investment Company																				
5	93 1006	40.0000	10000.00	Tribs.of North Fork of Hunting			N 2750	W 1640	SE	16	13S	6E	SL	X					X		
	WATER USE(S): IRRIGATION																				
	USA Bureau of Reclamation				125 South State Street																
6	93 9	.0000	.00	Kitchen Fork of Huntington Cre														X		X	X
	WATER USE(S): STOCKWATERING																				
	USA Forest Service				324 25th Street																
7	E2537	.0000	.00	Unnamed Spring			S 165	E 1580	W4	16	13S	6E	SL		X				X		
	WATER USE(S): DOMESTIC																				
	Dingman, Roy				P.O. Box 399																
8	93 4	.0000	.00	Kitchen Fork of Huntington Cre														X		X	X
	WATER USE(S): STOCKWATERING																				
	Crowther Investment Company																				
8	93 4	.0000	.00	Kitchen Fork of Huntington Cre														X		X	X
	WATER USE(S): STOCKWATERING																				
	Crowther Investment Company																				
9	93 345	.0200	.00	Unnamed Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Christensen, Richard S.				c/o Russell O. Brown, P.O. Box 711																
9	93 365	.0200	.00	Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Marriott, Douglas G.				c/o Russell O. Brown, P. O. Box 711																
9	93 344	.0200	.00	Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Shumway, R. Phil				c/o Russell O. Brown, P. O. Box 711																
9	93 343	.0200	.00	Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Stone, David J.				c/o Russell O. Brown, P.O. Box 711																
A	93 333	.0200	.00	Unnamed Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Christensen, Richard S.				c/o Russell O. Brown, P.O. Box 711																
A	93 331	.0200	.00	Spring														X		X	X
	WATER USE(S): STOCKWATERING																				
	Stone, David J.				c/o Russell O. Brown, P.O. Box 711																

Sec 16 T13S R6E

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

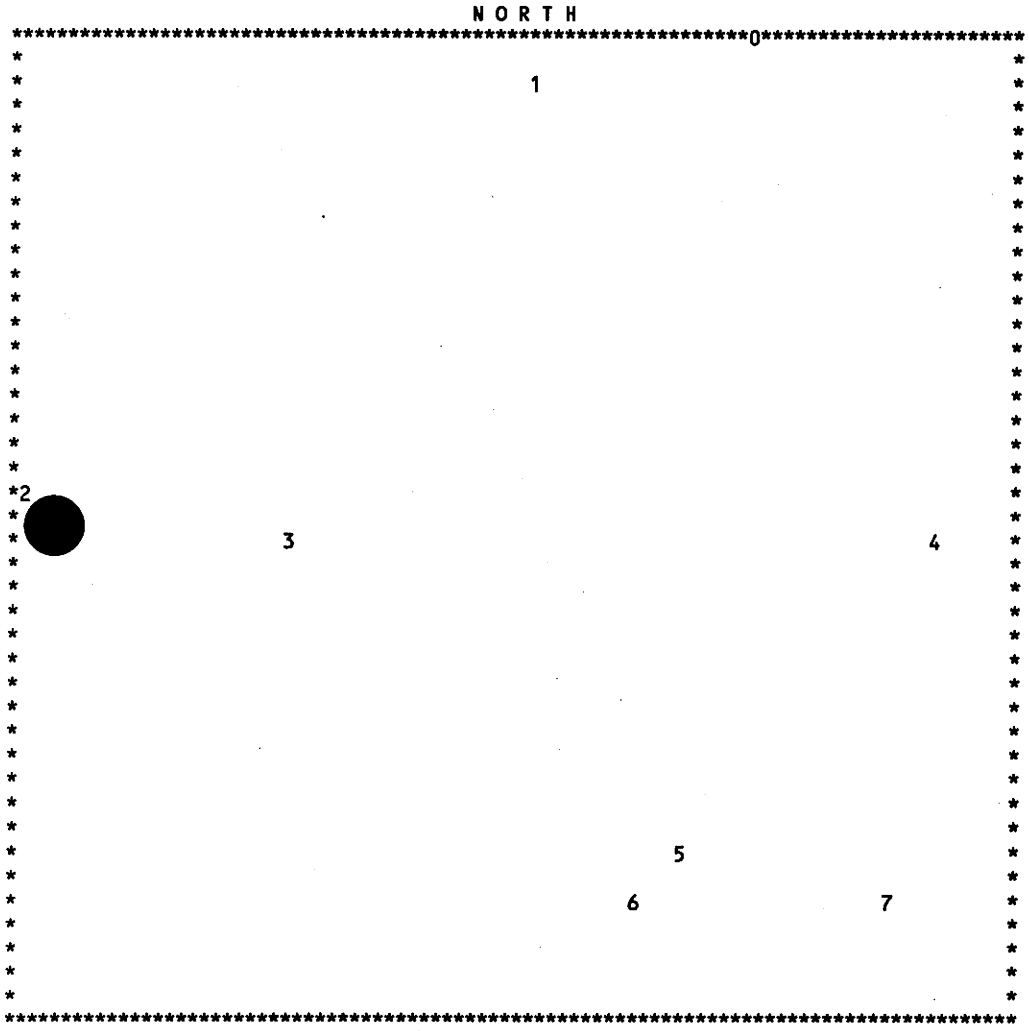
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNP	APPR	TERR	SURR	UGWP	PRED
A	93 332	.0200	.00	Spring											X		X		X
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1880								
	Shumway, R. Phil						c/o Russell O. Brown, P. O. Box 711				Provo,			UT 84601					
A	93 334	.0200	.00	Spring											X		X		X
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1880								
	Marriott, Douglas G.						c/o Russell O. Brown, P.O. Box 711				Provo			UT 84601					

Sec 16 T 9 S R 5

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:18 PM
PLOT SHOWS LOCATION OF 109 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 17 TOWNSHIP 13S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	TER	SUR	UGW	PRT	RED
0	91 4073	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4075	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4067	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4078	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 Eat 3365 South				Salt Lake City				UT 84101							
0	91 4070	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4077	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4069	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4079	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4076	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4072	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4080	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4064	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.l)				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4071	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4068	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4074	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							
0	91 4066	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City				UT 84101							

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UTAH DIVISION OF WATER RIGHTS
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MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PWD	RED
0	91 4081	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
0	91 4082	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
0	91 4065	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprise Inc.			2878 East 3365 South					Salt Lake City				UT 84109								
0	91 4083	.0000	8.84	12 Unnamed Springs			S 55	W 1370	NE	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
1	91 130	30.0000	.00	Cabin Hollow Creek, Brooks Cre			S 300	E 2700	NW	17	13S	6E	SL			X		X			
	WATER USE(S): IRRIGATION OTHER								PRIORITY DATE: 01/16/1941												
	Sanpete Water Conservancy District			P.O. Box 267					Mt. Pleasant				UT 84647								
1	a9237	30.0000	.00	Brooks Creek & Cabin Hollow Cr			S 300	E 2700	NW	17	13S	6E	SL			X		X			
	WATER USE(S): IRRIGATION								PRIORITY DATE: 01/10/1977												
	Sanpete Water Conservancy District			171 North Main					Ephraim				UT 84627								
2	91 4073	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4075	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4067	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4078	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 Eat 3365 South					Salt Lake City				UT 84101								
2	91 4070	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4077	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4069	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprise Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4079	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4076	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								
2	91 4072	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860												
	Gooseberry Enterprises Inc.			2878 East 3365 South					Salt Lake City				UT 84101								

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MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	TER	SUR	UGW	PRP	RED
2	91 4080	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4064	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.l)				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4071	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4068	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4074	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4066	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4081	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4082	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
2	91 4065	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South					Salt Lake City			UT 84109							
2	91 4083	.0000	8.84	12 Unnamed Springs			N 185	E 70	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
3	91 4073	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
3	91 4075	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
3	91 4067	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
3	91 4078	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 Eat 3365 South					Salt Lake City			UT 84101							
3	91 4070	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							
3	91 4077	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4	17	13S	6E	SL		X			X		
	WATER USE(S): DOMESTIC									PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South					Salt Lake City			UT 84101							

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MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG	B&M	UNP	APR	PER	TER	SUR	UGW	PWP	RED
3	91 4069	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4079	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4076	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4072	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4080	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4064	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.l)				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4071	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4068	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4074	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4066	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4081	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4082	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
3	91 4065	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprise Inc.				2878 East 3365 South				Salt Lake City			UT 84109								
3	91 4083	.0000	8.84	12 Unnamed Springs			S 30	E 1435	W4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
4	91 4073	.0000	8.84	12 Unnamed Springs			S 105	W 440	E4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								
4	91 4075	.0000	8.84	12 Unnamed Springs			S 105	W 440	E4 17	13S	6E	SL		X			X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Gooseberry Enterprises Inc.				2878 East 3365 South				Salt Lake City			UT 84101								

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MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH		EAST		CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUPPLEMENTAL	UNGAGED	PRESERVED
4	91 4067	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South																
																	PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4078	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 Eat 3365 South																
																	PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4070	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South																
																	PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4077	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South																
																	PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4069	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprise Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4079	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4076	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4072	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4080	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4064	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprise Inc.l)				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4071	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4068	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4074	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4066	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4081	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		
4	91 4082	.0000	8.84	12 Unnamed Springs			S	105	W	440	E4	17	13S	6E	SL		X		X		
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South												PRIORITY DATE: 00/00/1860				
																	Salt Lake City		UT 84101		

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APR	PER	TER	SUR	UGW	PRP	RED
4	91 4065	.0000	8.84	12 Unnamed Springs			S 105	W 440	E4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84109								
4	91 4083	.0000	8.84	12 Unnamed Springs			S 105	W 440	E4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4073	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4075	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4067	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4078	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 Eat 3365 South						Salt Lake City		UT 84101								
5	91 4077	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4069	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4079	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4076	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4080	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4064	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprise Inc.l)				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4071	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4068	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4066	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								
5	91 4081	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC										PRIORITY DATE: 00/00/1860										
	Gooseberry Enterprises Inc.				2878 East 3365 South						Salt Lake City		UT 84101								

Sec 17 T13S R6E

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

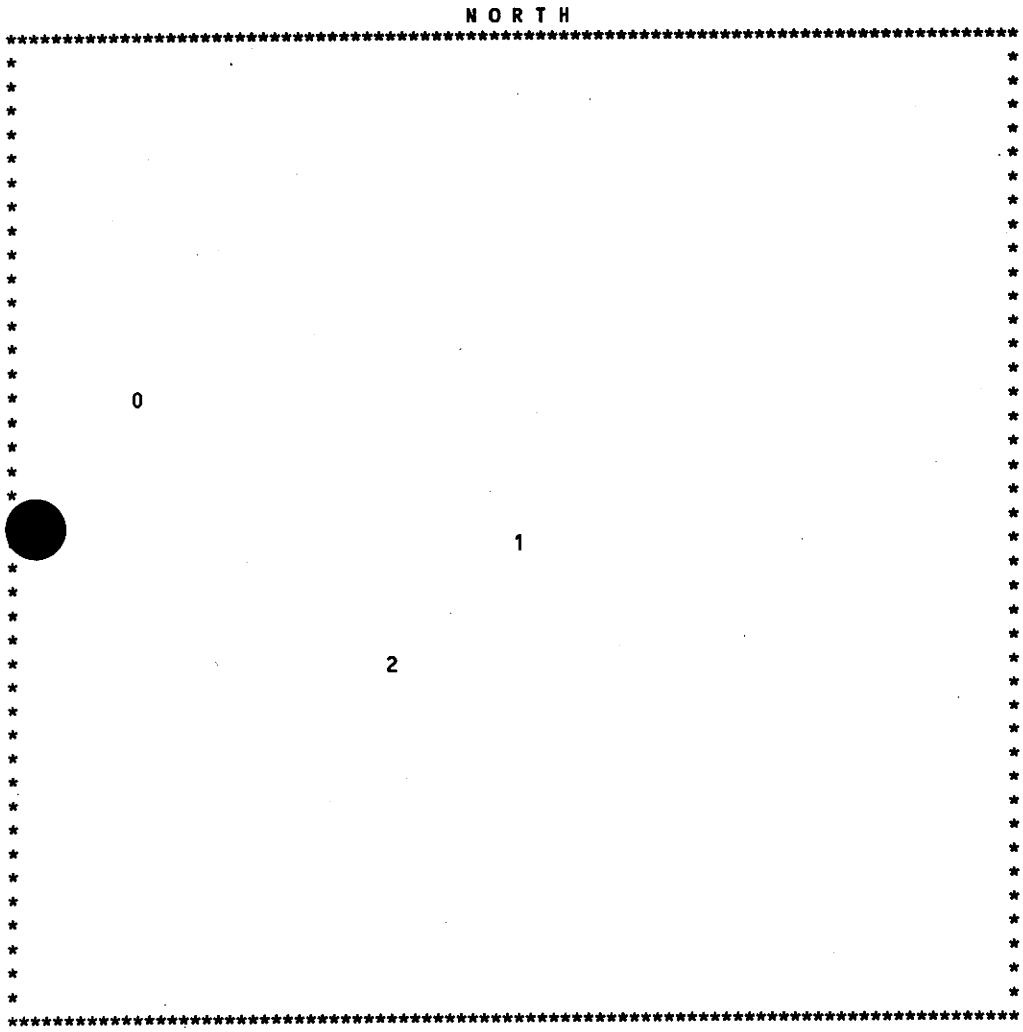
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
5	91 4082	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South																
											PRIORITY DATE: 00/00/1860										
											Salt Lake City										
													UT 84101								
5	91 4065	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprise Inc.				2878 East 3365 South																
											PRIORITY DATE: 00/00/1860										
											Salt Lake City										
													UT 84109								
5	91 4083	.0000	8.84	12 Unnamed Springs			N 890	E 860	S4	17	13S	6E	SL			X		X			
	WATER USE(S): DOMESTIC																				
	Gooseberry Enterprises Inc.				2878 East 3365 South																
											PRIORITY DATE: 00/00/1860										
											Salt Lake City										
													UT 84101								
6	93 430	.0222	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Clayson, Eli				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
6	93 429	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Evans, Don				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
6	93 404	.0222	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Brown, Russell O.				P. O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
6	93 431	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Thorstenson, Clark T.				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
6	93 411	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Hunt, M. Dover				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
7	93 380	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Hunt, M. Dover				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
7	93 391	.0222	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Clayson, Eli				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
7	93 379	.0222	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Brown, Russell O.				P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
7	93 402	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Thorstenson, Clark T.				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								
7	93 381	.0222	.00	Spring												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Evans, Don				c/o Russell O. Brown, P.O. Box 711																
											PRIORITY DATE: 00/00/1880										
											Provo										
													UT 84601								

Sec 17 T13S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:23 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 25 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

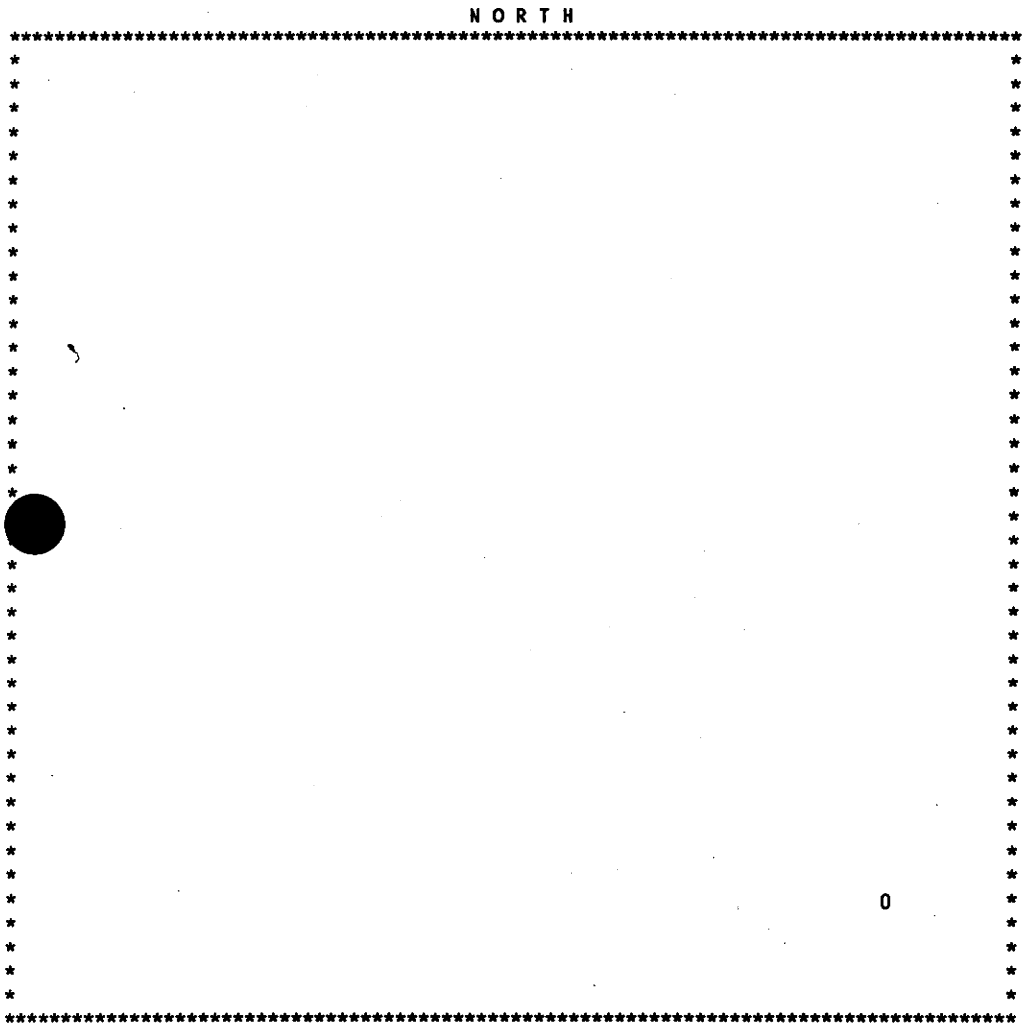
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APP	PER	TER	SUR	UGW	PTP	RED
0	91 1039	.0150	.00	Ledge Spring												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
0	91 1041	.0000	.00	Andrew Dairy Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
1	91 4320	.0000	.10	Andrew Dairy Pond												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
2	91 1040	.0000	.00	East Fork Dairy Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						

Sec 25 T 12S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:29 PM
PLOT SHOWS LOCATION OF 2 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 20 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

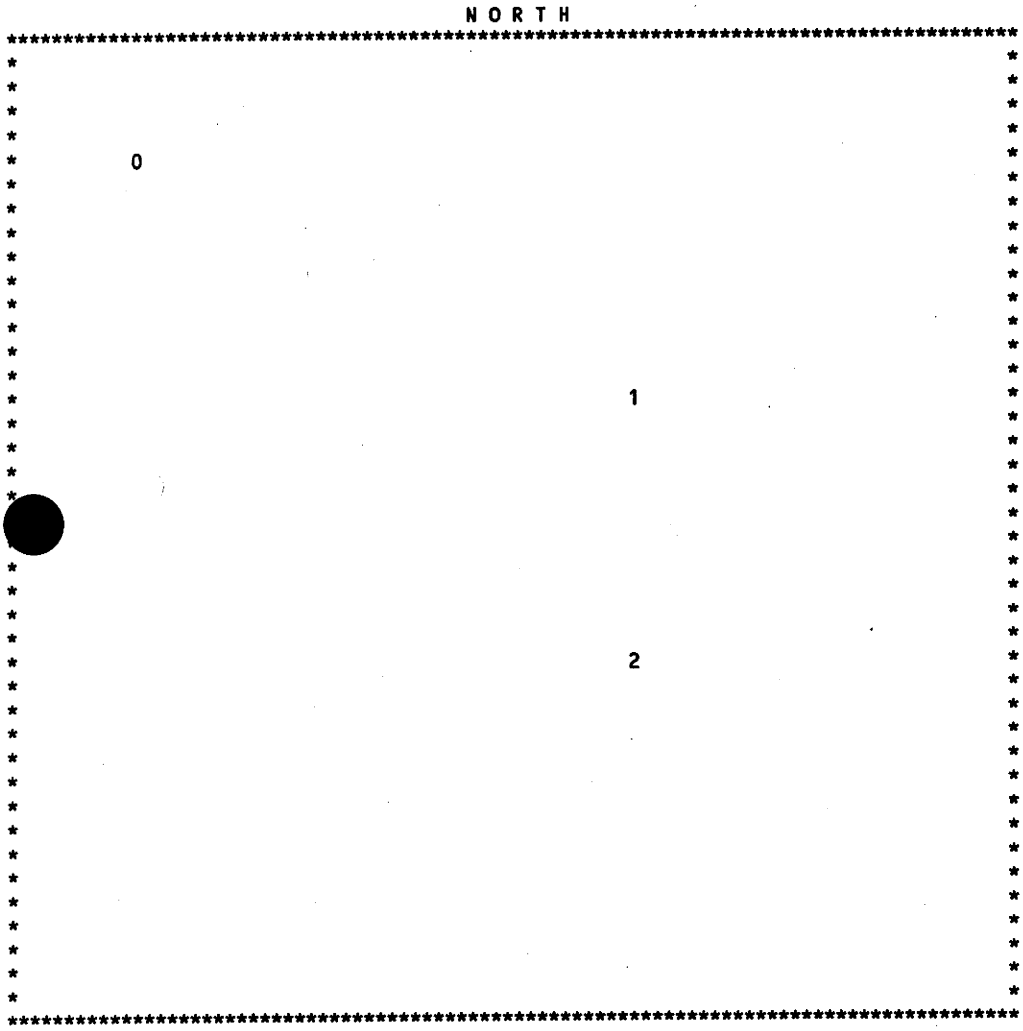
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APP	PER	TER	SUR	UGW	PWP	RED
0	91 1109	.0000	.00	Gooseberry Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden					UT	84401				
0	91 1108	.0000	.00	Gooseberry Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden					UT	84401				

Sec 20 T12S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:27 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 21 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

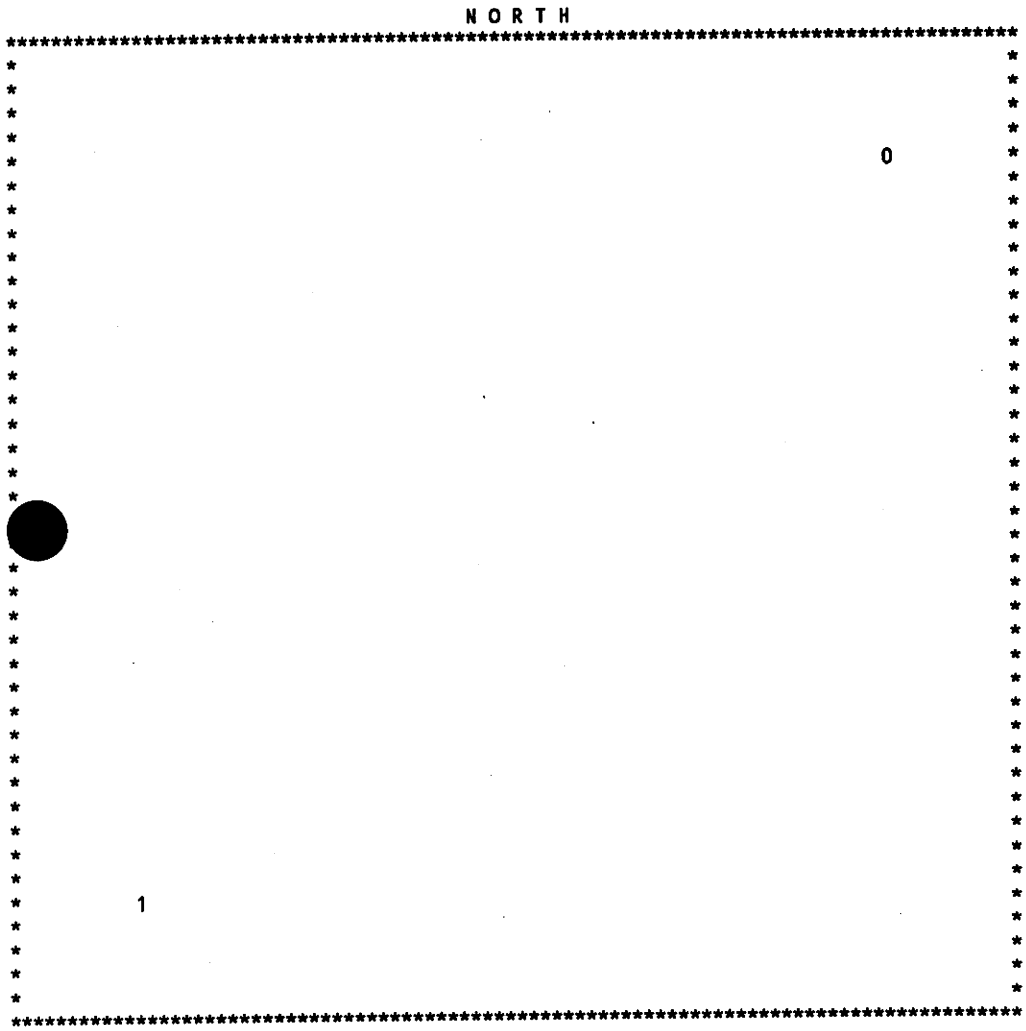
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
0	91 1108	.0000	.00	Gooseberry Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
0	91 1107	.0000	.00	Silver Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
1	91 1054	.0000	.00	Bean Ridge Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						
2	91 1053	.0110	.00	Bush Spring												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden			UT	84401						

Sec 21 T12S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:28 PM
PLOT SHOWS LOCATION OF 2 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 22 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

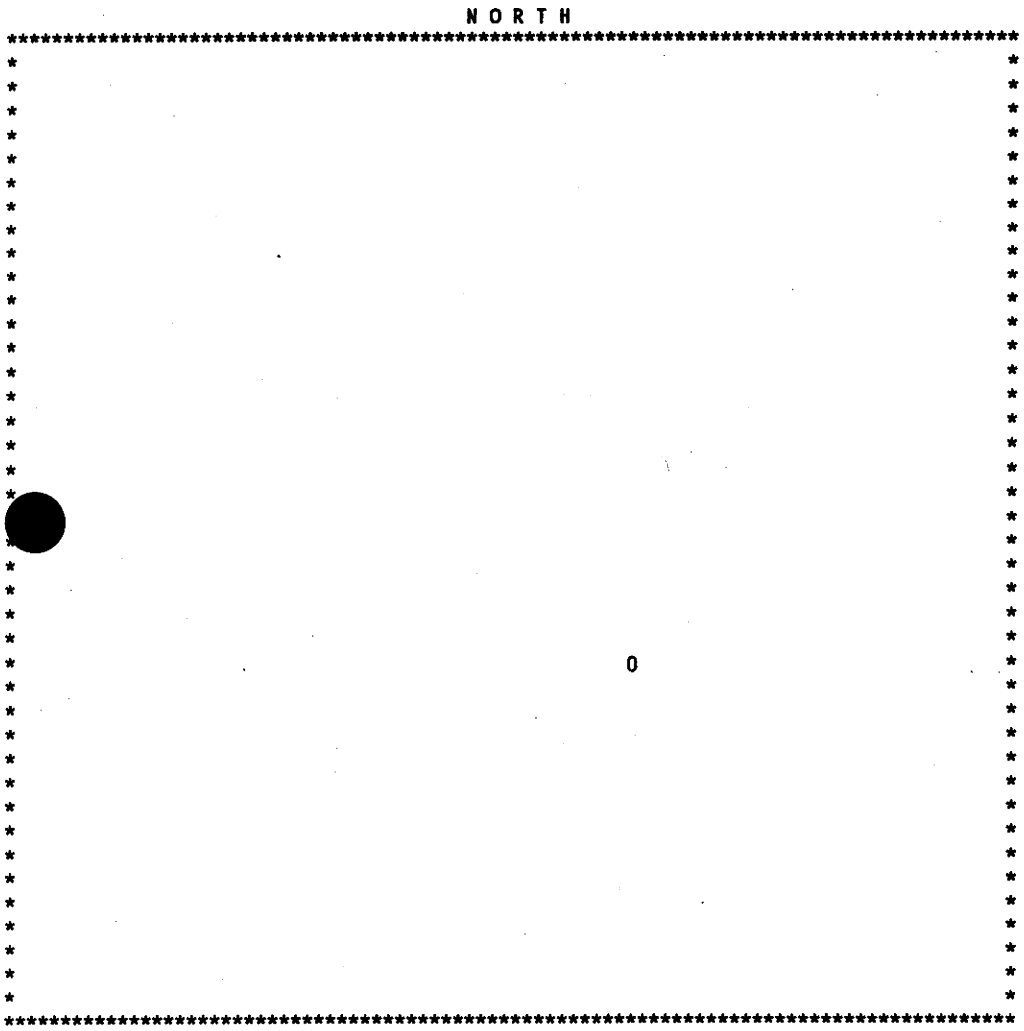
MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNP	APP	PER	TER	SUR	UGW	PWP	RED
0	91 1047	.0000	.00	Tributary to French Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden					UT	84401				
1	91 1048	.0000	.00	Tributary to French Creek												X		X		X	
	WATER USE(S): STOCKWATERING										PRIORITY DATE: 00/00/1860										
	USA Forest Service				324 25th Street						Ogden					UT	84401				

Sec 22 T12S R4E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:28 PM
PLOT SHOWS LOCATION OF 1 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 23 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	U N N	A P P	P E R	T E R	S U R	U G W	P T P	R E D
0	91 1051	.0000		.00 Anderson Creek												X		X		X	

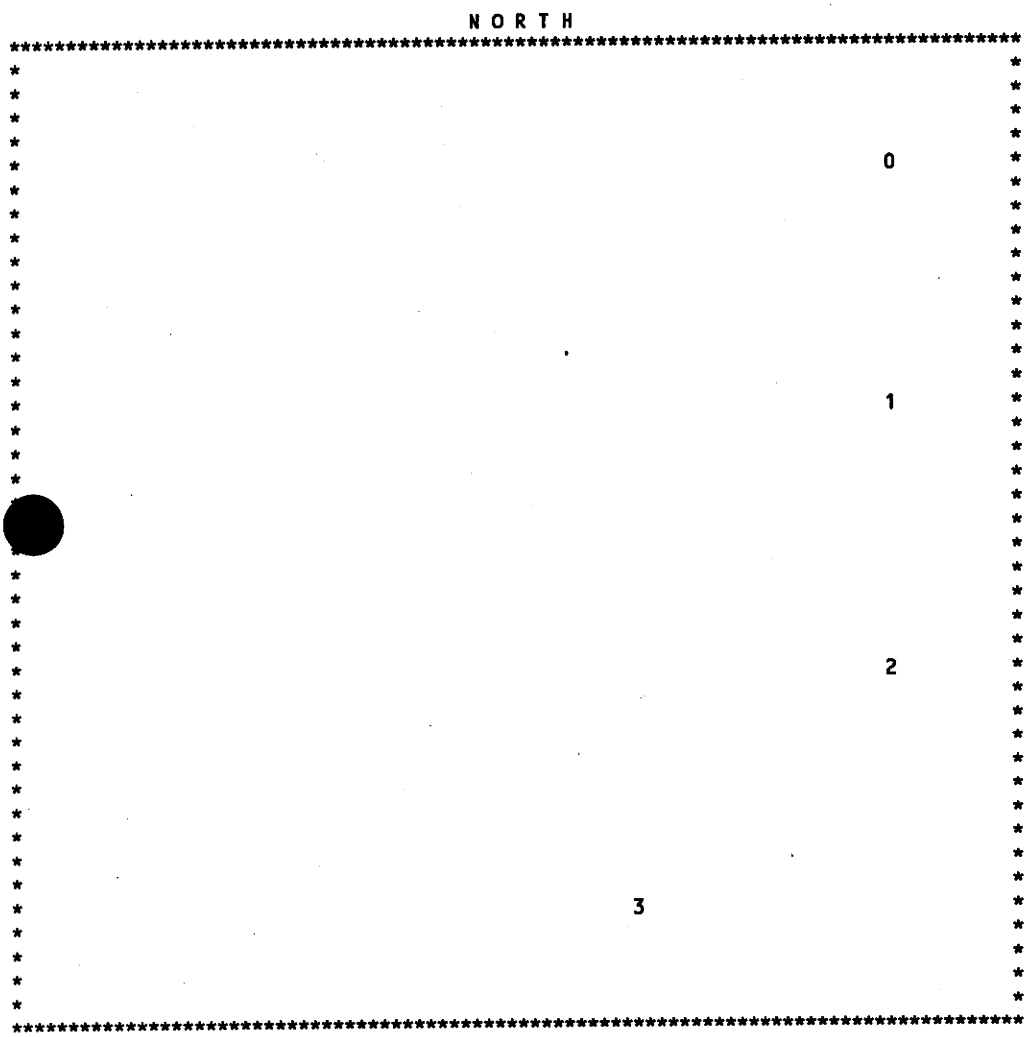
WATER USE(S): STOCKWATERING PRIORITY DATE: 00/00/1860
USA Forest Service 324 25th Street Ogden UT 84401

Sec 22 T12S R-6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:28 PM
PLOT SHOWS LOCATION OF 5 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 24 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNN	APP	TER	SUR	UGW	PTP	RED
0	91 1041	.0000	.00	Andrew Dairy Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
1	91 1042	.0000	.00	East Fork Dairy Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
1	91 1042	.0000	.00	East Fork Dairy Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden		UT 84401							
2	91 3915	.0110	.00	Unnamed Spring										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	Allred, D. Euray								Fountain Green		UT 84632							
3	91 1040	.0000	.00	East Fork Dairy Creek										X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860									
	USA Forest Service				324 25th Street				Ogden		UT 84401							

Sec 24 T12S R6E

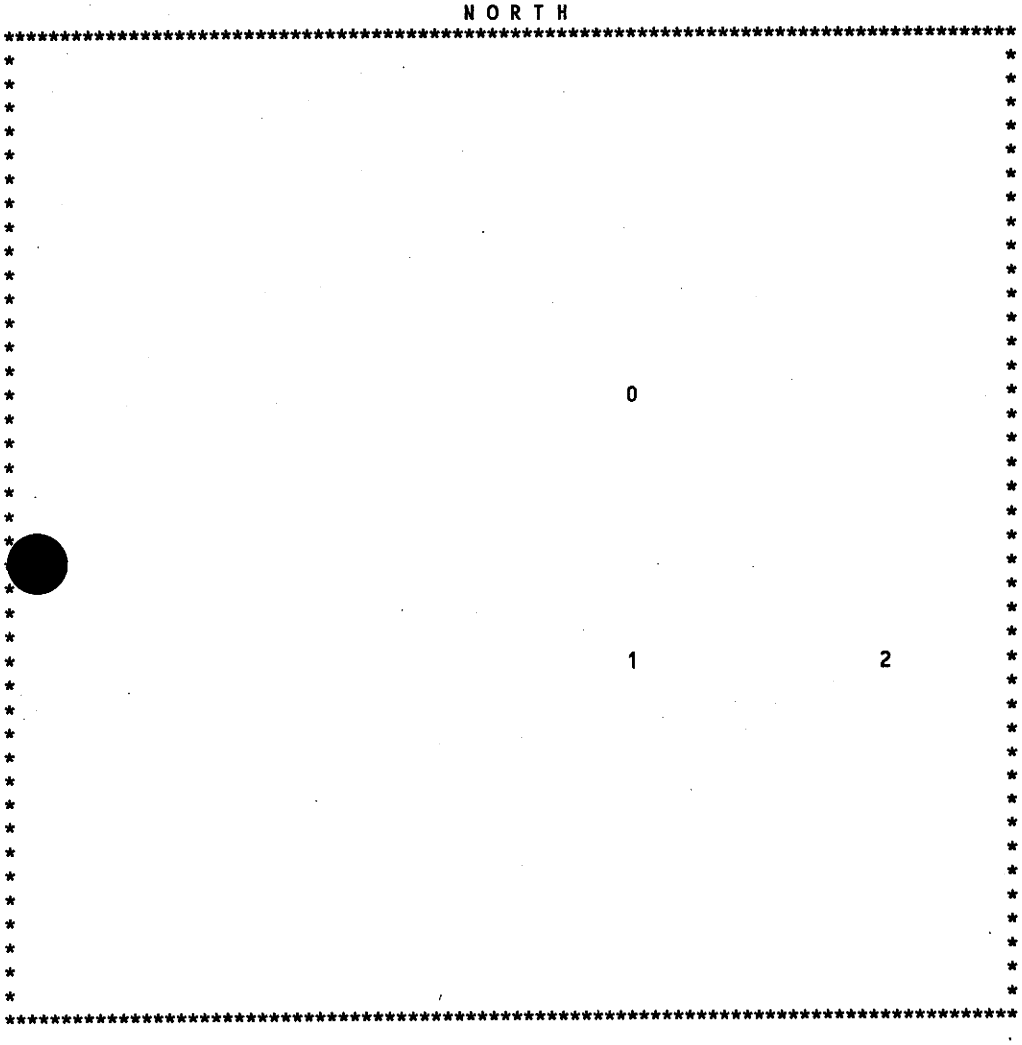
J

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:19 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 26 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET

N O R T H



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	PERMANENT	SUPPLEMENTAL	UGRWP	PROTESTED
0	91 1044	.0000		.00	Wife Creek											X	X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860					
	USA Forest Service				324 25th Street						Ogden		UT	84401					
0	91 1043	.0000		.00	Wife Creek											X	X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860					
	USA Forest Service				324 25th Street						Ogden		UT	84401					
1	91 3917	.0110		.00	Unnamed Spring											X	X		X
	WATER USE(S): DOMESTIC STOCKWATERING													PRIORITY DATE: 00/00/1860					
	Allred, D. Euray										Fountain Green		UT	84632					
2	91 3916	.0110		.00	Unnamed Spring											X	X		X
	WATER USE(S): DOMESTIC STOCKWATERING													PRIORITY DATE: 00/00/1860					
	Allred, D. Euray										Fountain Green		UT	84632					

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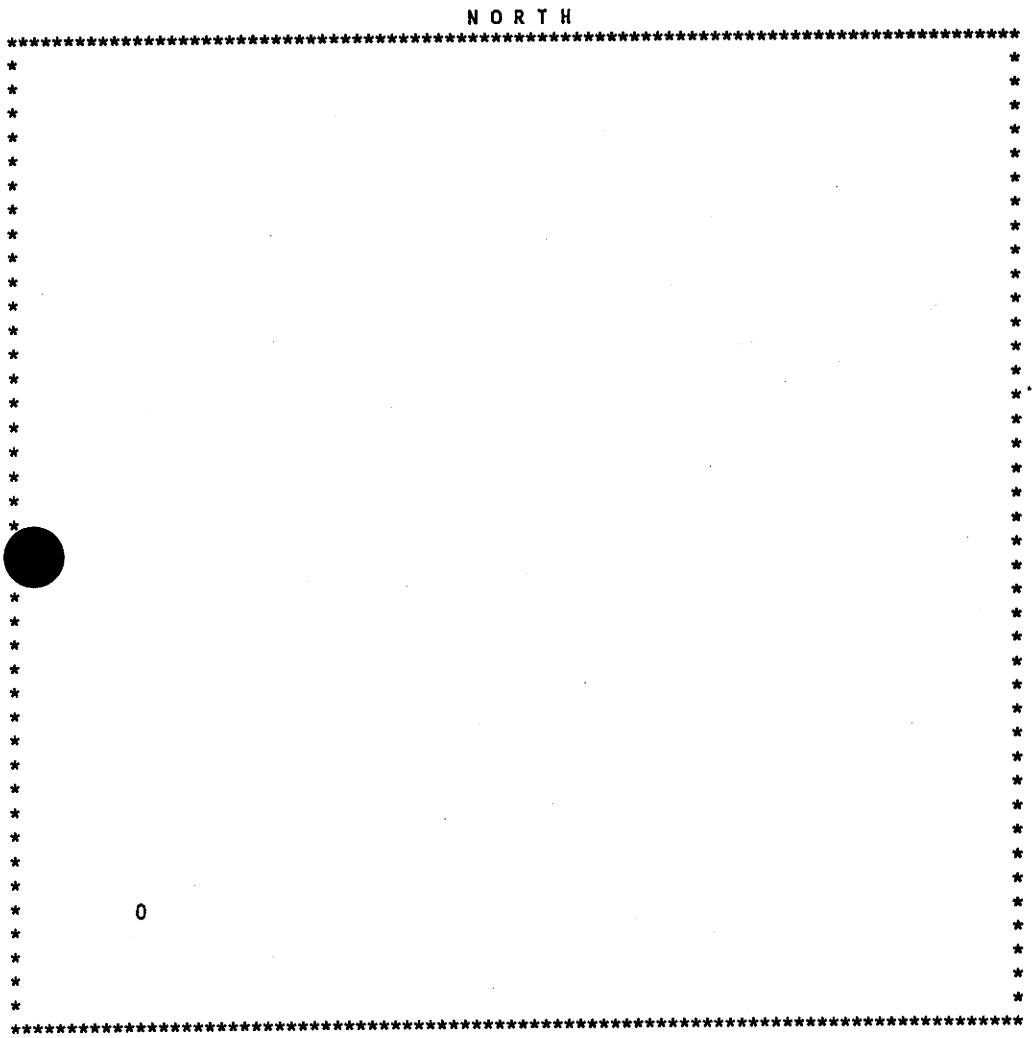
I

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:20 PM
PLOT SHOWS LOCATION OF 1 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 27 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR	QUANTITY AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNPP	APRR	PTER	SURR	UGRW	PWPR	RTED
0	91 1046	.0150		.00	Horn Spring												X	X	X		

WATER USE(S): STOCKWATERING PRIORITY DATE: 00/00/1860
USA Forest Service 324 25th Street Ogden UT 84401

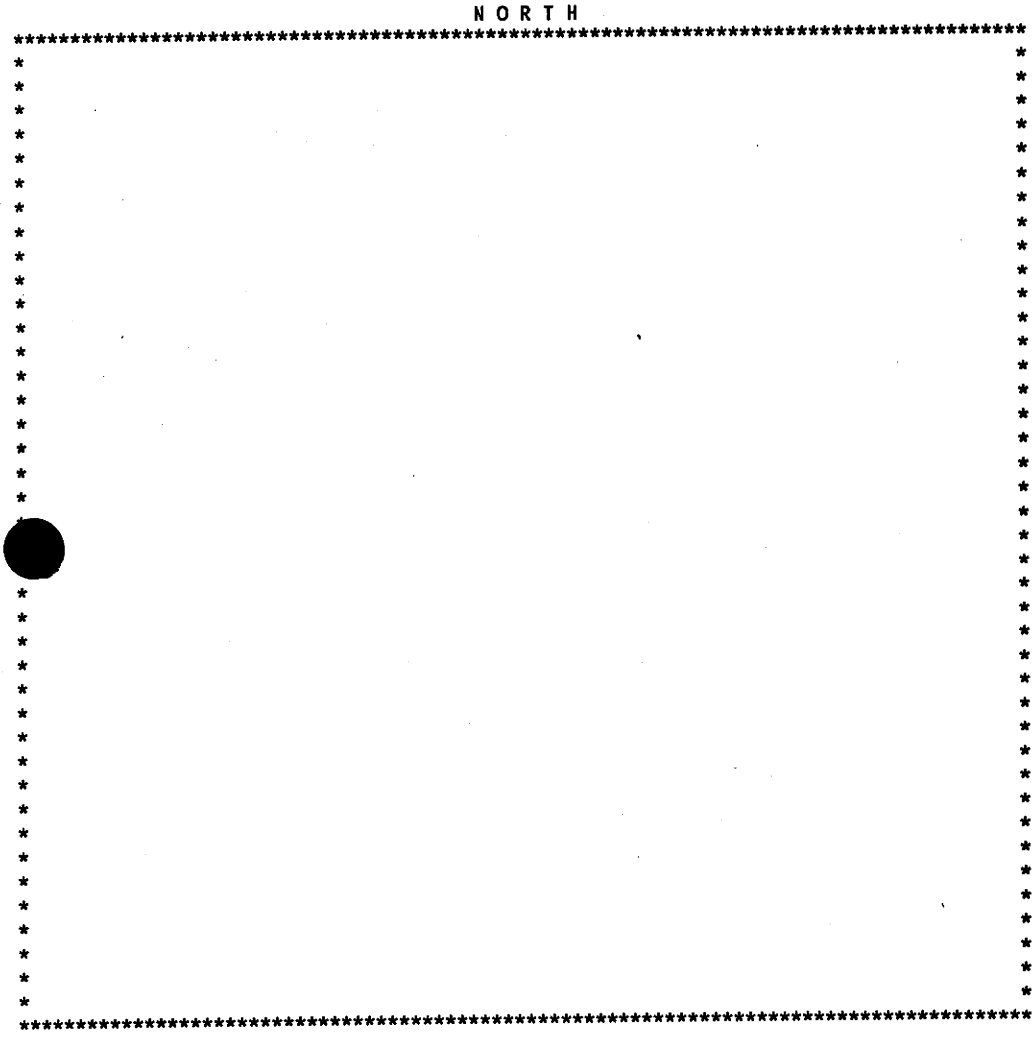
Sec. 27 T12S R6E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:29 PM
PLOT SHOWS LOCATION OF 0 POINTS OF DIVERSION

PLOT OF NE QUARTER(S) IN SECTION 28 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 500 FEET

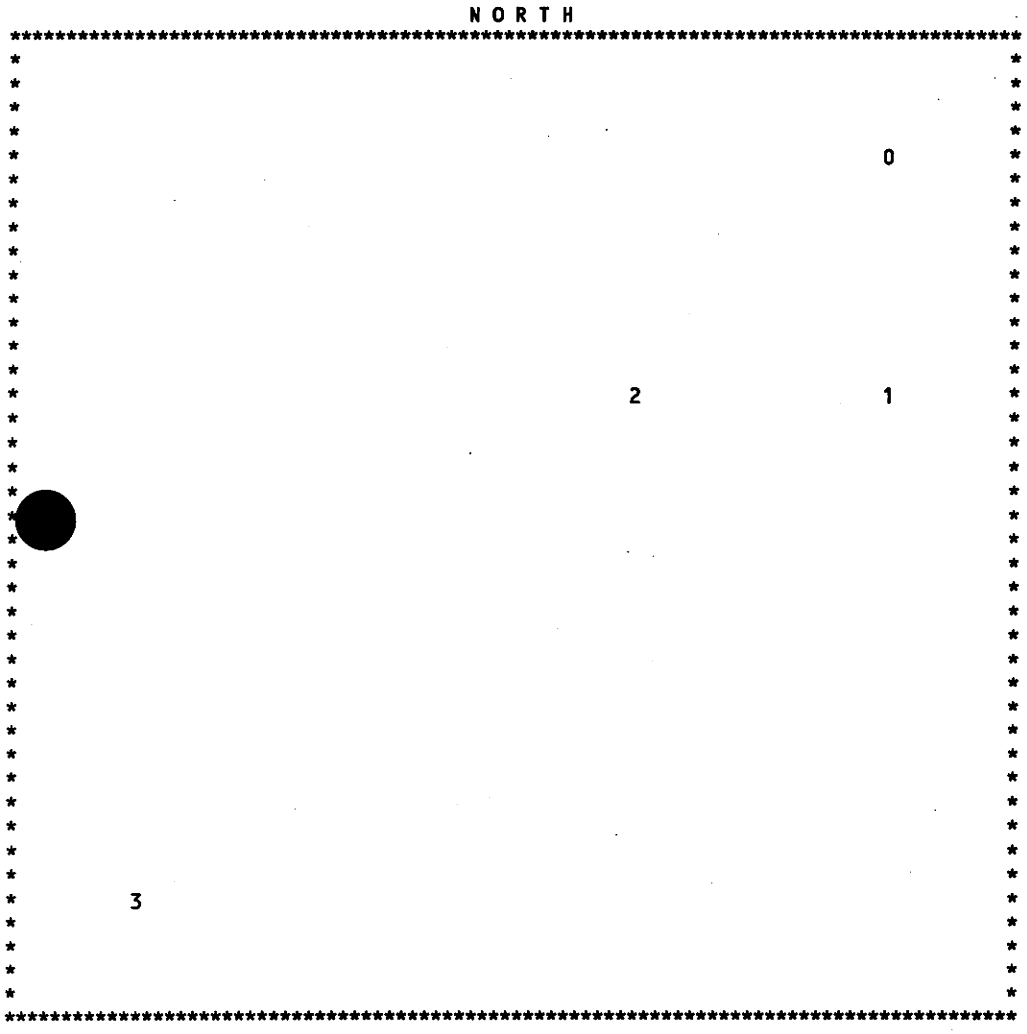
N O R T H



UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:27 PM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 29 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

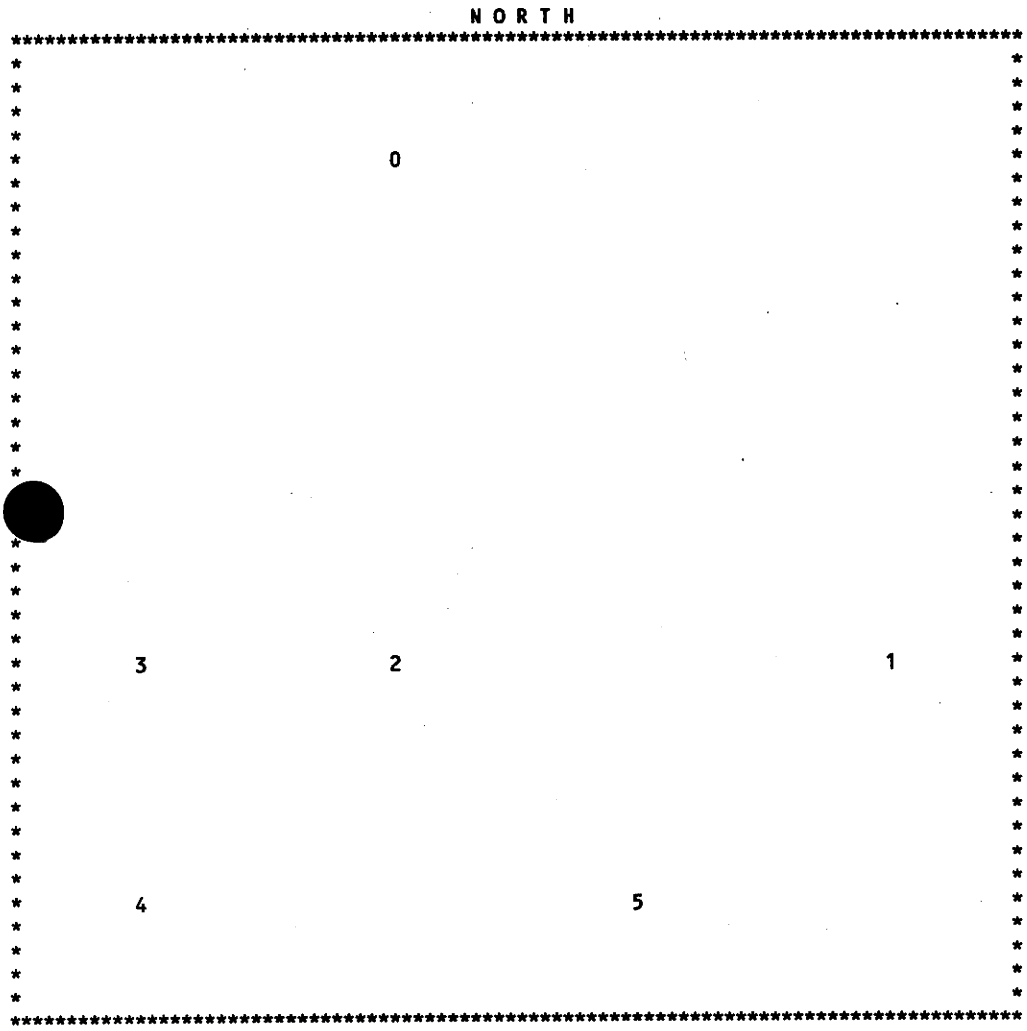
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUPPLEMENTAL	UNDERGROUND WATER	PROTESTED
0	91 3949	.0000	.00	Mill Creek									X		X	X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						
0	91 3949	.0000	.00	Mill Creek									X		X	X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						
0	91 3950	.0000	.00	Gooseberry Creek									X		X	X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						
0	91 3950	.0000	.00	Gooseberry Creek									X		X	X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						
1	91 1113	.0000	.00	Mill Creek									X		X	X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860								
	USA Forest Service				324-25th Street				Ogden		UT	84401					
1	91 1112	.0000	.00	Mill Creek									X		X	X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860								
	USA Forest Service				324-25th Street				Ogden		UT	84401					
2	91 3951	.0000	.00	Gooseberry Creek									X		X	X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						
3	91 3951	.0000	.00	Gooseberry Creek									X		X	X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860								
	Peterson, Lionel L.										UT						

Sec 29 T12S R1E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:29 PM
PLOT SHOWS LOCATION OF 6 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 32 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNN	APP	PER	TER	SUR	UGW	PTP	RED
0	91 3960	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							
1	91 3961	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							
2	91 3962	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							
3	91 3963	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							
4	91 3967	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							
5	91 3968	.0220	.00	Spring										X		X		X	
	WATER USE(S): Peterson, Lionel L.								PRIORITY DATE: 00/00/1860			UT							

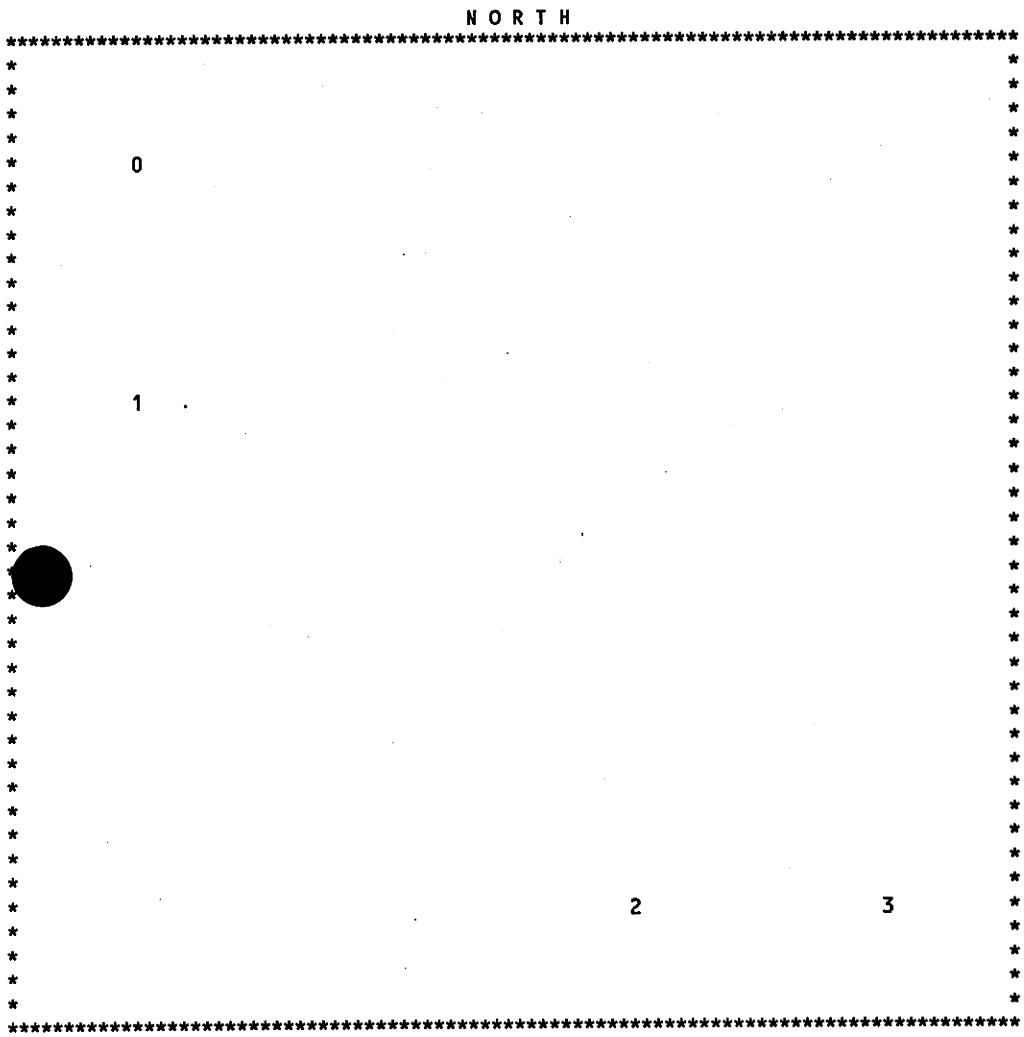
Sec 32 T12S R6E

F

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:28 PM
PLOT SHOWS LOCATION OF 5 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 33 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUPPLEMENTAL	UGRW	PROTEST	RECORDED
0	91 1114	.0000	.00	Tributary to Mill Creek												X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860						
	USA Forest Service				324 25th Street						Ogden				UT 84401					
1	91 1114	.0000	.00	Tributary to Mill Creek												X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860						
	USA Forest Service				324 25th Street						Ogden				UT 84401					
2	91 1049	.0000	.00	French Creek												X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860						
	USA Forest Service				324 25th Street						Ogden				UT 84401					
2	91 1050	.0000	.00	French Creek												X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860						
	USA Forest Service				324 25th Street						Ogden				UT 84401					
3	91 4348	.0150	.00	Unnamed Spring												X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860						
	USA Forest Service				324 25th Street						Ogden				UT 84401					

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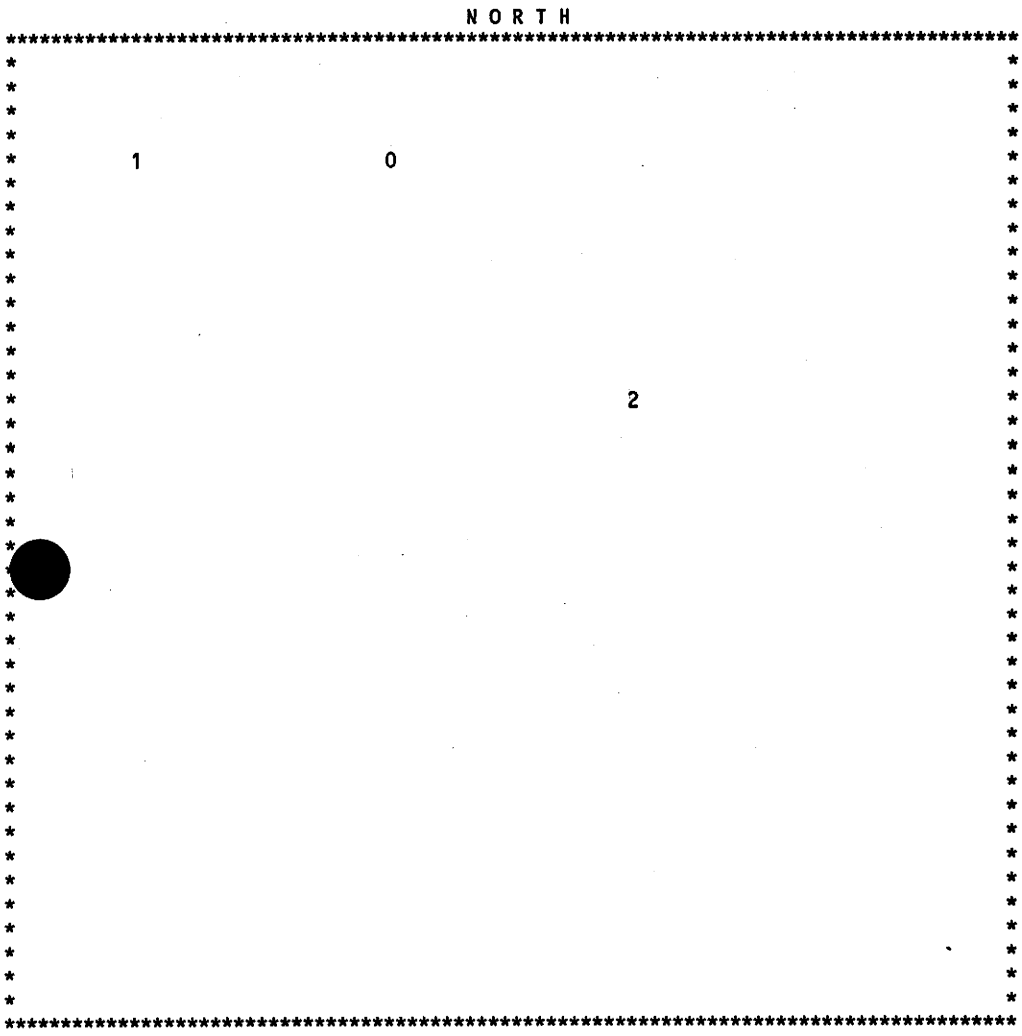
#1

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:22 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 34 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PWP	RED
0	91 1045	.0150	.00	Antler Spring												X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860												
	USA Forest Service				324 25th Street				Ogden				UT	84401							
0	91 1047	.0000	.00	Tributary to French Creek												X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860												
	USA Forest Service				324 25th Street				Ogden				UT	84401							
1	91 1048	.0000	.00	Tributary to French Creek												X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860												
	USA Forest Service				324 25th Street				Ogden				UT	84401							
2	91 4322	.0000	.10	Woods Canyon Pond												X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860												
	USA Forest Service				324 25th Street				Ogden				UT	84401							

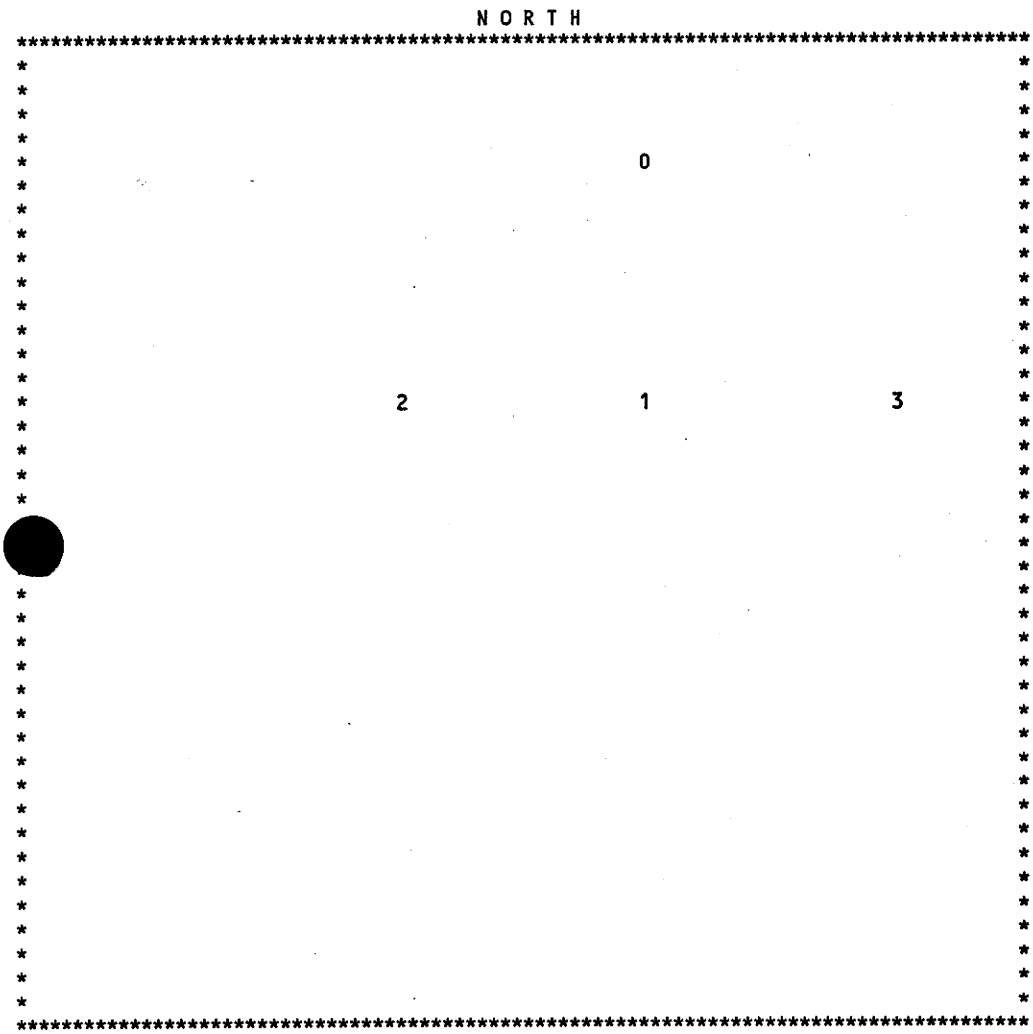
[illegible] T12S R6E

G

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED TUE, OCT 15, 1991, 3:23 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 35 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PWP	RED
0	91 3638	.0110	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	Allred, D. Euray													Fountain Green				UT	84632		
1	91 3631	.0000	.00	Woods Canyon Creek												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	Allred, D. Euray													Fountain Green				UT	84632		
2	91 1038	.0000	.00	Woods Canyon Creek												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	USA Forest Service				324-25th Street									Ogden				UT	84401		
3	91 3918	.0110	.00	Unnamed Spring												X		X		X	
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860							
	Allred, D. Euray													Fountain Green				UT	84632		

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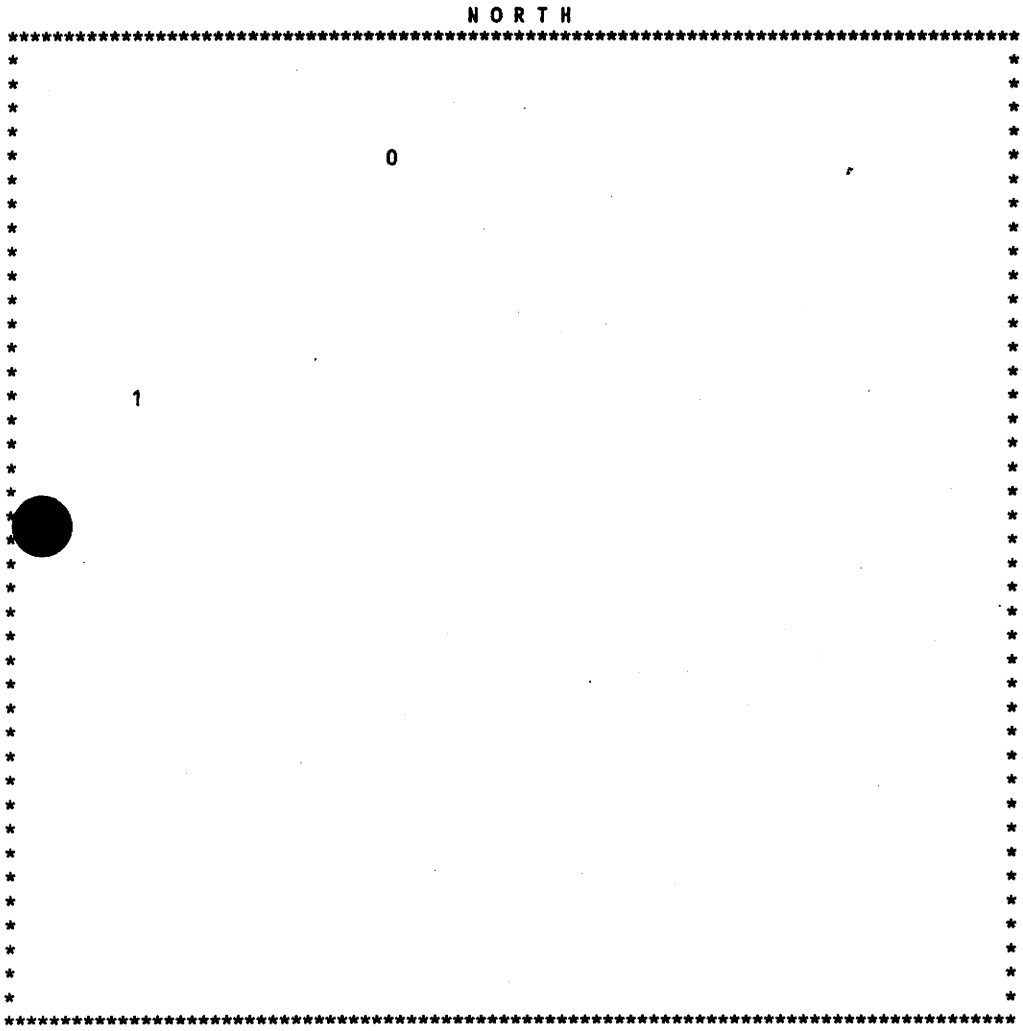
UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:25 PM
PLOT SHOWS LOCATION OF 2 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 36 TOWNSHIP 12S RANGE 6E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNPN	APPR	PERR	TERR	SUWR	UGW	PWP	RED
0	91 3634	.0110		.00	Unnamed Spring											X		X		X	
	WATER USE(S): STOCKWATERING																				
	Allred, D. Euray																				
										PRIORITY DATE: 00/00/1860											
										Fountain Green				UT 84632							
1	91 3919	.0110		.00	Unnamed Spring											X		X		X	
	WATER USE(S): STOCKWATERING																				
	Allred, D. Euray																				
										PRIORITY DATE: 00/00/1860											
										Fountain Green				UT 84632							

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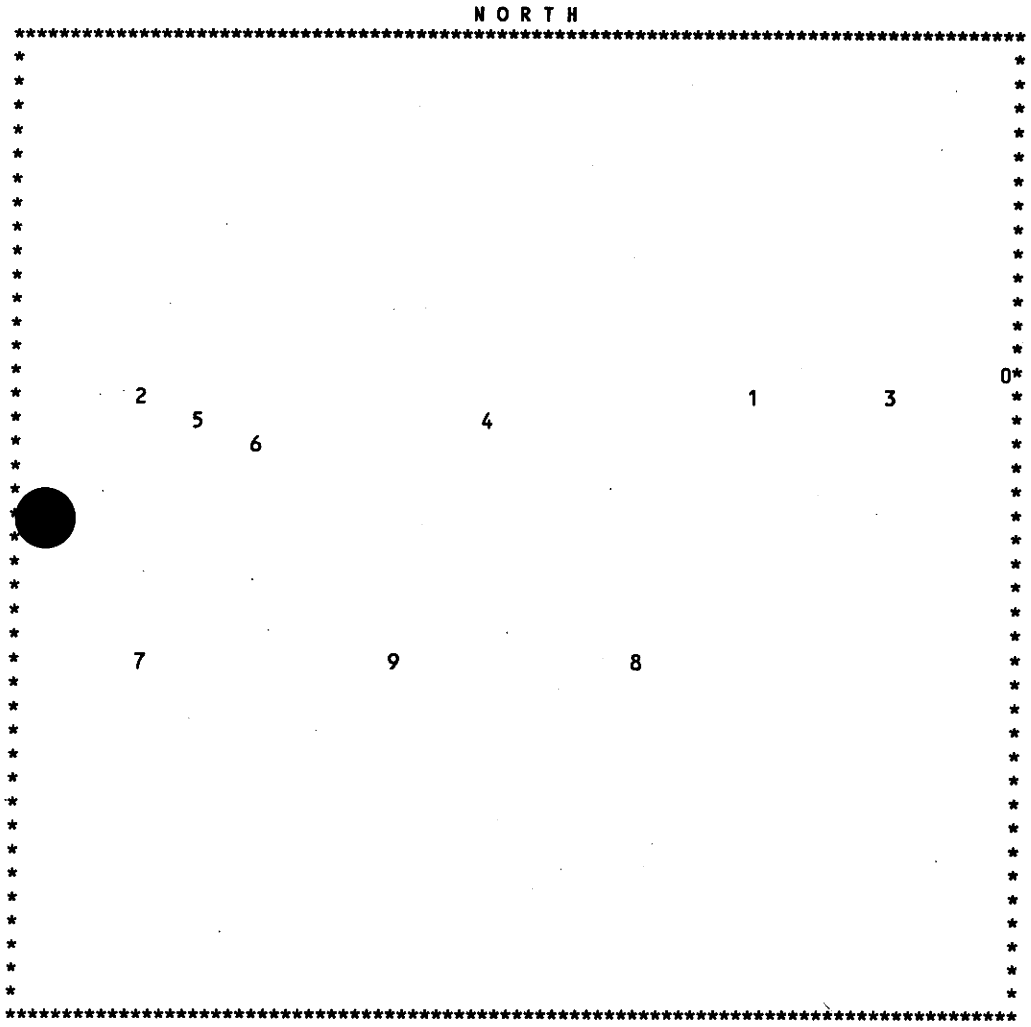
UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:26 PM
PLOT SHOWS LOCATION OF 16 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 6 TOWNSHIP 13S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

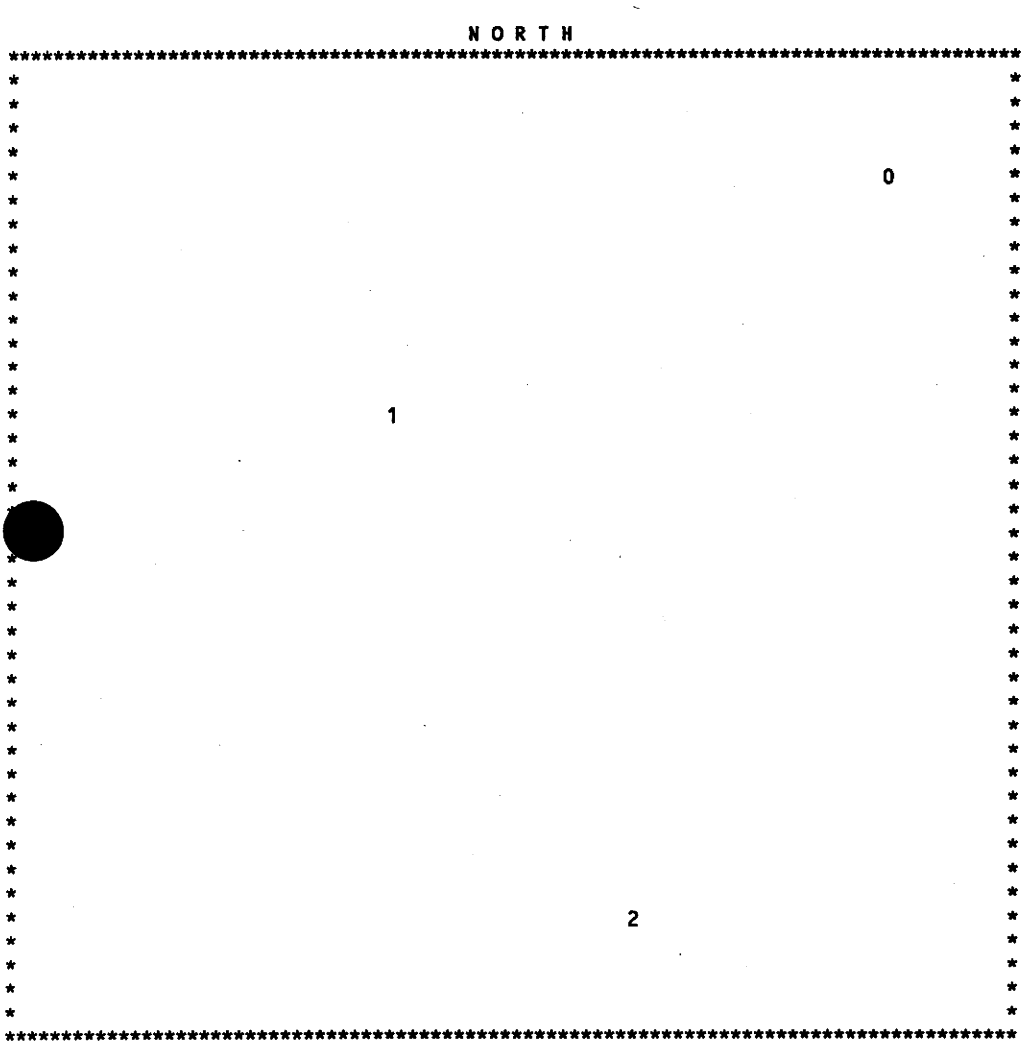
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNP	APPR	PTER	STER	UGRR	UWTR	PRED
0	91 3010	.2130	.00	Winter Quarters Creek			N 780	W 60	E4	6	13S	7E	SL		X		X			
	WATER USE(S): IRRIGATION								PRIORITY DATE: 00/00/1874											
	Jensen, Fred and Shelia												UT							
0	91 3009	.0680	.00	Winter Quarters Creek			N 780	W 60	E4	6	13S	7E	SL		X		X			
	WATER USE(S): IRRIGATION								PRIORITY DATE: 00/00/1874											
	Simonsen, Elrie M. & Bertha								Scofield				UT							
1	91 3007	.6300	.00	Winter Quarters Creek			N 700	W 1400	E4	6	13S	7E	SL		X		X			
	WATER USE(S): IRRIGATION								PRIORITY DATE: 00/00/1874											
	Simonsen, Elrie M. & Bertha								Scofield				UT							
1	91 483	.4430	.00	Winter Quarters Creek			N 700	W 1400	E4	6	13S	7E	SL		X		X			
	WATER USE(S): IRRIGATION STOCKWATERING								PRIORITY DATE: 00/00/1874											
	Radakovich, Robert				340 North 6th East				Price				UT 84501							
2	91 462	.0000	.00	Winter Quarters Creek											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Eureka Energy Company				215 Market Street				San Francisco				CA 94106							
2	91 423	.0000	.00	Winter Quarters Creek											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Marakis, Nick				165 E. 100 S.				Price				UT 94106							
3	91 462	.0000	.00	Winter Quarters Creek											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Eureka Energy Company				215 Market Street				San Francisco				CA 94106							
3	91 423	.0000	.00	Winter Quarters Creek											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Marakis, Nick				165 E. 100 S.				Price				UT 94106							
4	E1934	.0000	20.00	Underground Water Well			S 2100	E 2500	NW	6	13S	7E	SL	X			X			
	WATER USE(S): OTHER								PRIORITY DATE: 06/29/1981											
	UCO, Incorporated				1580 Lincoln Suite 530				Denver				UT 80203							
5	E1934	.0000	20.00	Underground Water Well			S 2100	E 1000	NW	6	13S	7E	SL	X			X			
	WATER USE(S): OTHER								PRIORITY DATE: 06/29/1981											
	UCO, Incorporated				1580 Lincoln Suite 530				Denver				UT 80203							
6	91 2144	.0220	.00	Simonsen Spring			N 470	E 1280	W4	6	13S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Simonsen, Elrie & Bertha								Scofield				UT							
6	91 2145	.0220	.00	Simonsen Spring			N 470	E 1280	W4	6	13S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Radakovich, Robert				340 North 6th East				Price				UT 84501							
7	91 464	.0220	.00	Unnamed Spring											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Eureka Energy Company				215 Market Street				San Francisco				CA 94106							
7	91 425	.0220	.00	Unnamed Spring											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Marakis, Nick				165 E. 100 S.				Price				UT							
8	91 455	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Radakovich, Robert				340 North 6th East				Price				UT 84501							
9	91 481	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Radakovich, Robert				340 North 6th East				Price				UT 84501							

Sec 4 T13S R7E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:27 PM
PLOT SHOWS LOCATION OF 6 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 7 TOWNSHIP 13S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

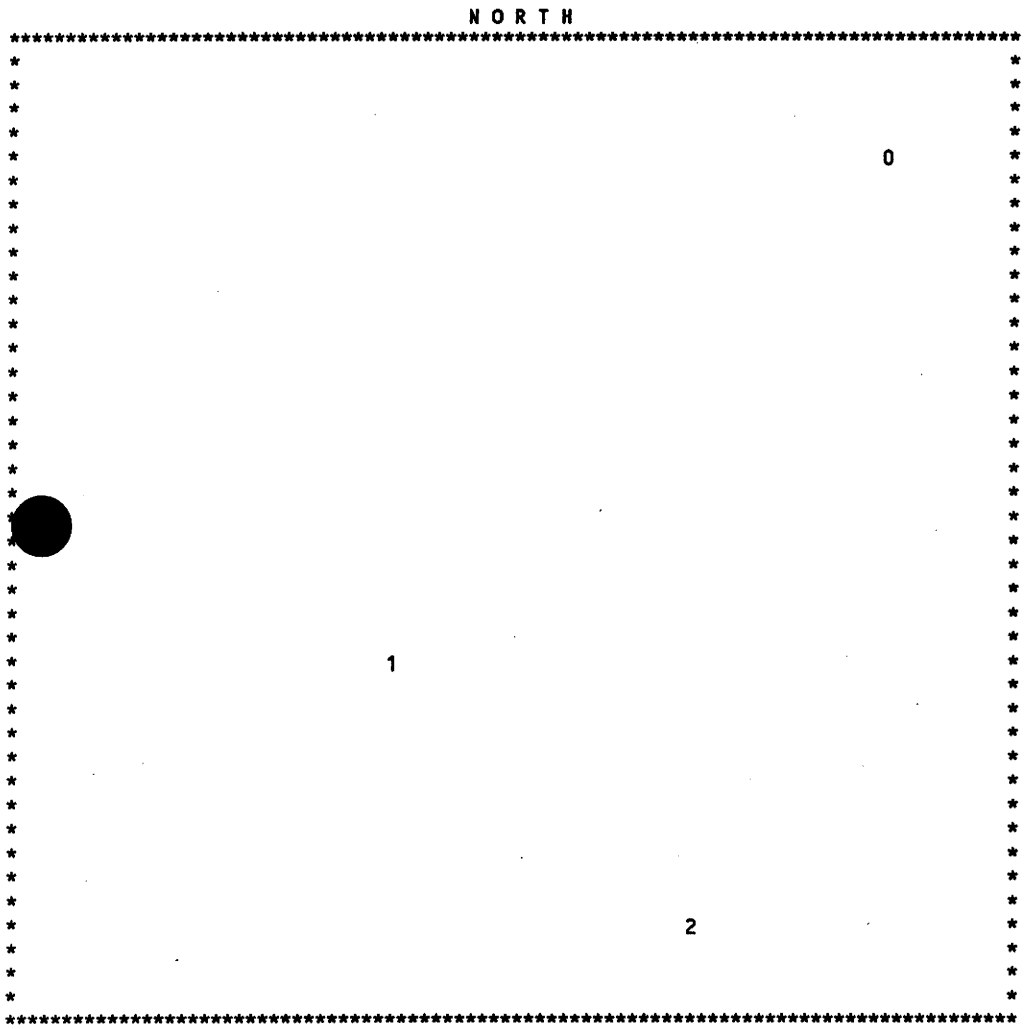
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNP	APPR	PERR	TEUR	SUWR	UGWP	PRTED
0	91 2669	.0110	.00	Unnamed Spring												X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Simonsen, H.B. & Della								Price				UT	84501						
0	91 482	.0000	.00	Unnamed Stream												X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Radakovich, Robert					340 North 6th East			Price				UT	84501						
0	91 482	.0000	.00	Unnamed Stream												X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Radakovich, Robert					340 North 6th East			Price				UT	84501						
1	91 475	.0110	.00	Unnamed Spring												X		X		X
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Marakis, John					165 East 1st South			Price				UT	84501						
1	91 435	.0110	.00	Unnamed Spring												X		X		X
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Marakis, Nick					165 East 1st South			Price				UT	84501						
2	91 1148	.0000	.00	Green Canyon Stream												X		X		X
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1860											
	Nicolaides, Tom & Leon					1026 East 1st South			Salt Lake City				UT	84101						
	Daraban, Mary Stathis & Bessie												UT							

Sec 7 T18S R7E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:22 PM
PLOT SHOWS LOCATION OF 4 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 18 TOWNSHIP 13S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUPPLEMENTAL	UGRW	PROTEST	RECORDED
0	91 1148	.0000	.00	Green Canyon Stream											X		X		X	
	WATER USE(S): STOCKWATERING																			
	Nicolaides, Tom & Leon				1026 East 1st South															
	Daraban, Mary Stathis & Bessie																			
1	91 474	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S):																			
	Marakis, John				165 East 1st South															
1	91 434	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S):																			
	Marakis, Nick				165 East 1st South															
2	E1560	.0000	118.00	8	500 - 1000		N 460	W 1725	SW	17	13S	7E	SL		X			X		
	WATER USE(S): MINING																			
	Coastal States Energy Company				Nine Greenway Plaza															

PRIORITY DATE: 00/00/1860
Salt Lake City UT 84101
UT

PRIORITY DATE: 00/00/1902
Price UT 84501

PRIORITY DATE: 00/00/1902
Price UT 84501

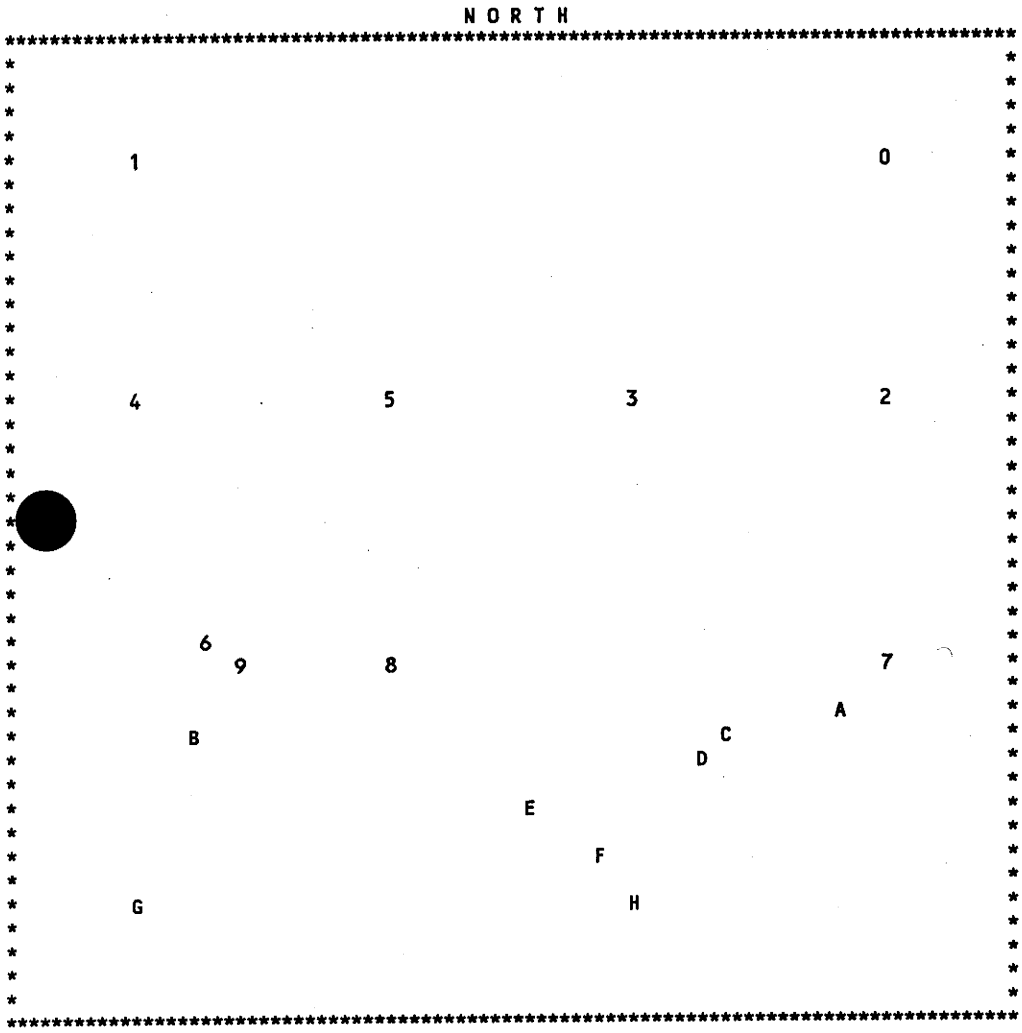
PRIORITY DATE: 07/19/1979
Houston TX 77046

Sec 18 T13S R7E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:29 PM
PLOT SHOWS LOCATION OF 25 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 19 TOWNSHIP 12S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	PER	TER	SUR	UGW	PRT	RED
0	91 3969	.0220		.00 Unnamed Spring												X		X		X	
	WATER USE(S): DOMESTIC STOCKWATERING																				
	Fasselin, Caroline																				
	PRIORITY DATE: 00/00/1860																				
	UT																				
0	91 3970	.0220		.00 Unnamed Spring												X		X		X	
	WATER USE(S): DOMESTIC STOCKWATERING																				
	Fasselin, Caroline																				
	PRIORITY DATE: 00/00/1860																				
	UT																				
1	91 3875	.0000		.00 Stream												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Frandsen, G. Pete				24 West 1stSouth																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
1	91 3577	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD Box 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
1	91 3637	.0000		.00 Dairy Creek												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete																				
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
2	91 3572	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD Box 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
2	91 3571	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD Box 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
3	91 3044	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete (c/o Duane Frandsen)				321 North 7th East																
	PRIORITY DATE: 00/00/1860																				
	Price												UT	84501							
4	91 3875	.0000		.00 Stream												X		X		X	
	WATER USE(S): STOCKWATERING																				
	Frandsen, G. Pete				24 West 1stSouth																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
4	91 3576	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
5	91 3575	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD Box 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
6	91 4229	.0000		25.60 Three Springs			S	630	E	1040	W4	19	12S	7E	SL			X		X	
	WATER USE(S): DOMESTIC																				
	Scofield Mountain Home Recreation Assoc. 4420 Briarwood Circle																				
	PRIORITY DATE: 08/14/1980																				
	Holladay												UT	84117							
7	91 3570	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete				RFD Box 213																
	PRIORITY DATE: 00/00/1860																				
	Tooele												UT	84074							
8	91 3043	.0110		.00 Unnamed Spring												X		X		X	
	WATER USE(S):																				
	Frandsen, Pete (c/o Duane Frandsen)				321 North 7th East																
	PRIORITY DATE: 00/00/1860																				
	Price												UT	84601							
9	91 4229	.0000		25.60 Three Springs			S	755	E	1190	W4	19	12S	7E	SL			X		X	
	WATER USE(S): DOMESTIC																				
	Scofield Mountain Home Recreation Assoc. 4420 Briarwood Circle																				
	PRIORITY DATE: 08/14/1980																				
	Holladay												UT	84117							
A	E1483	.0000		1.00	6	100 - 300	S	990	W	900	E4	19	12S	7E	SL	X			X		
	WATER USE(S): DOMESTIC																				
	Scofield Mountain Home Recreation Assoc. 4420 Briarwood Circle																				
	PRIORITY DATE: 05/03/1979																				
	Holladay												UT	84117							

Sec 19 T12S R7E

UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MA CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNN	APP	TER	SUR	UGW	PWP	RED
B	91 4229	.0000	25.60	Three Springs			S 1080	E 980	W4	19	12S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 08/14/1980											
	Scofield Mountain Home Recreation Assoc. 4420 Briarwood Circle								Holladay				UT 84117							
C	91 3573	.0880	.00	Unnamed Spring			N 1500	W 1520	SE	19	12S	7E	SL		X		X			
	WATER USE(S): IRRIGATION								PRIORITY DATE: 00/00/1860											
	Frandsen, G. Pete			P.O. Box 717					Tooele				UT 84074							
D	91 3042	.0110	.00	Unnamed Springs			N 1445	E 990	S4	19	12S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Scofield Mountain Home Recreation Associ 4420 Briawood Circle								Holladay				UT 84117							
E	91 3042	.0110	.00	Unnamed Springs			N 1105	E 90	S4	19	12S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Scofield Mountain Home Recreation Associ 4420 Briawood Circle								Holladay				UT 84117							
F	91 3042	.0110	.00	Unnamed Springs			N 865	E 425	S4	19	12S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 00/00/1860											
	Scofield Mountain Home Recreation Associ 4420 Briawood Circle								Holladay				UT 84117							
F	91 2	.0000	12020.00	Gooseberry Creek			N 860	E 430	S4	19	12S	7E	SL		X				X	
	WATER USE(S): IRRIGATION DOMESTIC STOCKWATERING MUNICIPAL POWER OTHER								PRIORITY DATE: 08/30/1906											
	Price River Water Users Association								Price				UT 84501							
F	E375	.0000	6.00	Spring			N 860	E 430	S4	19	12S	7E	SL		X		X			
	WATER USE(S): DOMESTIC								PRIORITY DATE: 07/16/1970											
	Scofield Mountain Home Recreation Associ 4420 Briarwood Circle								Holladay				UT							
G	91 3632	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S): STOCKWATERING								PRIORITY DATE: 00/00/1902											
	Allred, D. Euray								Fountain Green				UT 84632							
H	91 3574	.0110	.00	Unnamed Spring											X		X		X	
	WATER USE(S):								PRIORITY DATE: 00/00/1860											
	Frandsen, G. Pete			P.O. Box 717					Tooele				UT 84074							

Sec 19 T12S R7E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:23 PM
PLOT SHOWS LOCATION OF 3 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 30 TOWNSHIP 12S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET

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UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

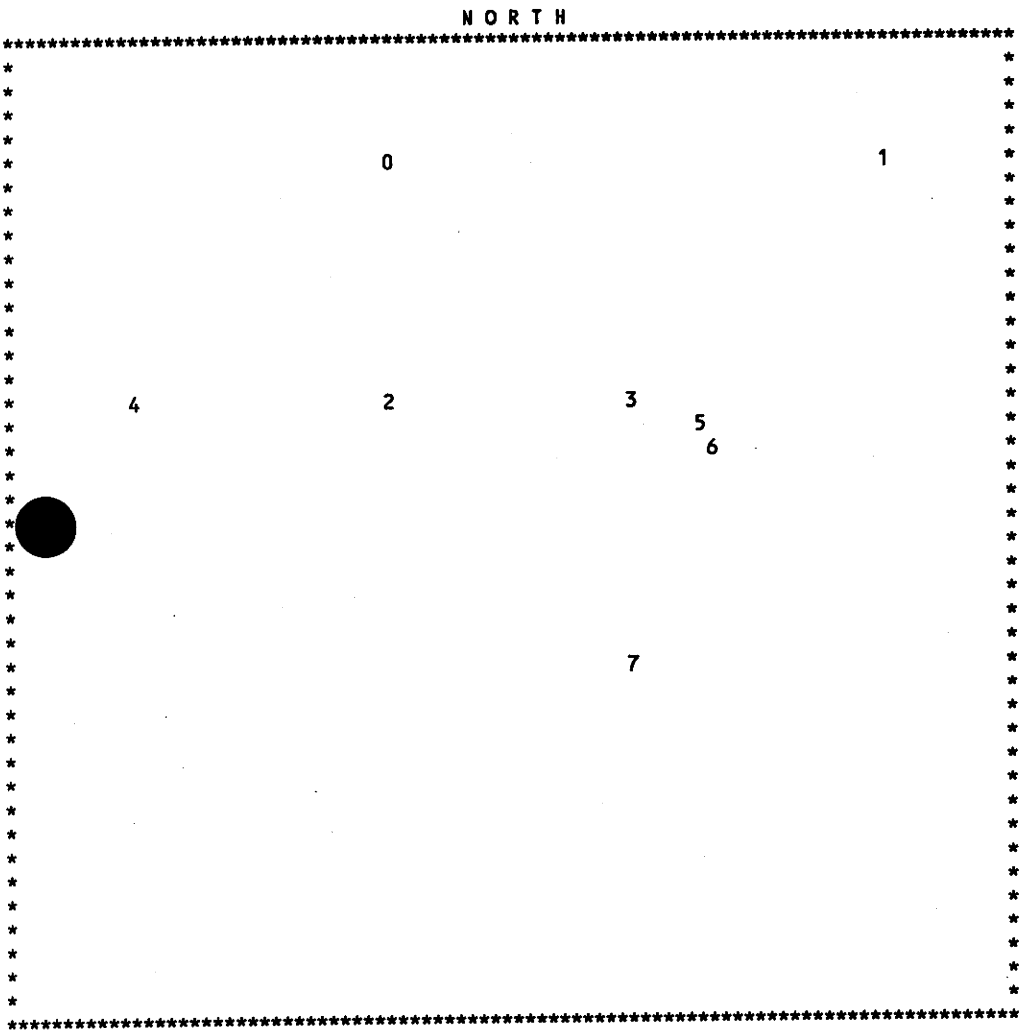
MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR SEC	TWN	RNG B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUPPLEMENTAL	UNDERGROUND WATER	PROTESTED
0	91 3163	.0110		.00 Unnamed Spring									X		X		X
	WATER USE(S): Frandsen, Pete				FRD Box 213				PRIORITY DATE: 00/00/1860 Tooele		UT 84074						
1	91 3641	.0000		.00 Unnamed Stream									X		X		X
	WATER USE(S): Frandsen, Pete				Box 213				PRIORITY DATE: 00/00/1902 Tooele		UT 84074						
2	91 3642	.0110		.00 Unnamed Spring									X		X		X
	WATER USE(S): Jones, Bill B. and Utahna Pace								PRIORITY DATE: 00/00/1902 Palmyra		UT 84660						

Sec 30 T12S R7E

UTAH DIVISION OF WATER RIGHTS
WATER RIGHT POINT OF DIVERSION PLOT CREATED MON, AUG 31, 1992, 2:24 PM
PLOT SHOWS LOCATION OF 8 POINTS OF DIVERSION

PLOT OF ALL QUARTER(S) IN SECTION 31 TOWNSHIP 12S RANGE 7E SL BASE AND MERIDIAN

PLOT SCALE IS APPROXIMATELY 1 INCH = 1000 FEET



UTAH DIVISION OF WATER RIGHTS
NWPLAT POINT OF DIVERSION LOCATION PROGRAM

MAP CHAR	WATER RIGHT	QUANTITY CFS	QUANTITY AND/OR AC-FT	SOURCE DESCRIPTION or WELL INFO DIAMETER	DEPTH	YEAR LOG	POINT OF DIVERSION DESCRIPTION NORTH	EAST	CNR	SEC	TWN	RNG	B&M	UNNAMED	APPROPRIATED	TEMPORARY	SUBJECT TO GW	PROTESTED	RECEIVED
0	91 3920	.0110		.00	Unnamed Spring										X		X		X
	WATER USE(S): DOMESTIC STOCKWATERING													PRIORITY DATE: 00/00/1860					
	Allred, D. Euray													Fountain Green			UT	84632	
1	91 3658	.0000		.00	Unnamed Stream										X		X		X
	WATER USE(S):													PRIORITY DATE: 00/00/1902					
	Jones, Bill B. and Utahna Pace													Palmyra			UT	84660	
2	91 3631	.0000		.00	Woods Canyon Creek										X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860					
	Allred, D. Euray													Fountain Green			UT	84632	
3	91 2495	.0000		.00	Woods Canyon Creek										X		X		X
	WATER USE(S):													PRIORITY DATE: 00/00/1860					
	Simonsen, Elrie & Bertha													Scofield			UT		
4	91 3922	.0110		.00	Unnamed Spring										X		X		X
	WATER USE(S): STOCKWATERING													PRIORITY DATE: 00/00/1860					
	Allred, D. Euray													Fountain Green			UT	84632	
5	91 3405	.5000		.00	Woods Canyon Creek		N 540	W 1610	E4	31	12S	7E	SL		X		X		
	WATER USE(S): IRRIGATION STOCKWATERING													PRIORITY DATE: 00/00/1874					
	Simonsen, Elrie & Bertha													Scofield			UT		
6	91 2494	.0000		.00	Mooney Mine Spring		N 490	W 1580	E4	31	12S	7E	SL		X		X		
	WATER USE(S): IRRIGATION STOCKWATERING													PRIORITY DATE: 00/00/1874					
	Simonsen, Elrie & Bertha				General Delivery									Scofield			UT		
7	91 2288	.0110		.00	Unnamed Spring										X		X		X
	WATER USE(S):													PRIORITY DATE: 00/00/1860					
	Simonsen, Elrie & Bertha													Scofield			UT		

Sec 31 T12S R7E

Winter Quarters Canyon
Data Adequacy

October 1992

LETTERS REGARDING SCHOFIELD RESERVOIR, DEPARTMENT OF HEALTH AND THE PLEASANT VALLEY COMMITTEE

THE PLEASANT VALLEY COMMITTEE

"For The Protection of The Scofield Watershed"

P.O. Box 1106 — Price, Utah 84501

GARTH FRANDSEN
Chairman

LEAH ANN SCHIRLE
Secretary

Telephone
(801) 637-5444

MANTI-LASAL N.F.
OCT 26 1989

Copy to: D-3
Route to Joel

October 25, 1989

TO: PLEASANT VALLEY COMMITTEE (PVC)

FROM: LAL Leah Ann Lamb, SEUALG Water Quality Director Kelly SK

RE: PVC MEETING - PRE-WINTER DISCUSSION OF ICE FISHING AT SCOFIELD RESERVOIR: THURSDAY NOVEMBER 9, 1989 AT 7:00 PM IN THE CARBON COUNTY COMMISSION CHAMBERS

The Pleasant Valley Committee (PVC) will meet on Thursday evening, November 9, 1989 at 7:00 pm in the Carbon County Commission Chambers.

The PVC last met on March 7, 1989 to discuss issues surrounding the controversay of ice fishing at Scofield Reservoir. The committee determined that three subcommittees needed to be established to encourage interagency resolution of the main problems affecting water quality at Scofield. These work committees are: Facilities, Enforcement, and Education. My beautiful baby daughter was born 23 day after the last PVC meeting and this summer I failed to coordinate the subcommittees to seriously address these issues. However, I am confident that we can begin now and make good progress.

Also since the last PVC meeting, the Price River Water Improvement District and the Division of Wildlife Resources developed and completed a new water sampling program at Scofield Reservoir to assess the effects of recreational users. Representatives from these agencies will present their findings at the November meeting. Other efforts have been made at Scofield since the last PVC meeting including a County sponsored Scofield Clean Up Day and a County sponsored grant application for a Clivus Mulstrum restroom facility for day users. I feel the PVC can build on these efforts to protect the water quality of Scofield Reservoir. Your participation is greatly appreciated!!

The meeting agenda is attached. Please call me at 637-5444 if you have any suggestions or questions.

Joel:
I will plan to attend
[illegible]
11/2/89

DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

Norman H. Bangerter
Governor
Suzanne Dandoy, M.D., M.P.H.
Executive Director
Kenneth L. Alkema
Director

288 North 1460 West
P.O. Box 16690
Salt Lake City, Utah 84116-0690
(801) 538-6121

D-3
Walt Nowak
Route to
J. Franklin
B. Roberts
R. Player

MANTI-LASAL N.F.
OCT 10 1989

FS		ROUTE
RG		
T		
F		

October 5, 1989

FOREST SERVICE
MANTI-LASAL NATIONAL FOREST
OCT 12 1989

Leah Ann Lamb, Water Quality Director
Southeastern Utah Association of Local Governments
P.O. Drawer 1106
Price, Utah 84501

Dear Leah Ann:

The purpose of this letter is to solicit any support available in persuading of local property owners to cooperate under existing programs to implementing stream fencing projects. These projects will enhance the development of riverine riparian habitat and control the agriculture source of pollution to the tributies of Scofield Reservoir.

As you know, nutrient enrichment of Scofield Reservoir is a critical problem effecting beneficial uses of the reservoir. Excess phosphorus and nitrogen loading to the reservoir has repeatedly been documented in studies by a variety of governmental agencies.

In recent years considerable resources have been expended in an effort to identify and control nutrient pollution within the watershed of Scofield Reservoir. Periodically, complaints are expressed regarding the deterioration of water quality at Scofield Reservoir. Annually, the focus is on ice fishing as the only source accountable for pollution to the reservoir. It is a well established fact that nutrient enrichment of Scofield Reservoir is a problem and there exists several sources of these nutrients. However, as identified in the Phase I Clean Lake Study and other investigations, it is evident that emphasis should be directed toward the control of these nutrients within the watershed to eliminate their movement to the reservoir. Nutrients unchecked in the watershed enrich the reservoir and cause excessive biological productivity, including extensive blue-green algae blooms which threaten the fishery and lead to periodic fish kills as reported by the Utah Division of Wildlife Resources (UDWR). They have verified fish kills in 1961, 1977, 1981, 1987 and 1988.

Control of nutrients from the watershed is the focus of a Clean Lake Phase II grant received August 8, 1984 with supplemental grants in succeeding years to complete the needed projects. Approximately 31 percent of the phosphorus (limiting nutrient) load comes from the Mud Creek drainage. The Phase II streambank stabilization program was designed to reduce sediment and nutrient loading by the reestablishing and protecting the riparian vegetative community. The work plan has focused on placement of stream riprap, revetments, and checkdams, planting grass and willows, and raising the water table of pastureland near the stream by restoring irrigation to the area.

Despite controversy with some property owners in the project area, much has been accomplished towards improving the integrity of the stream and the water quality in this drainage. Considerable effort and support has been extended by individuals and private companies who have a desire to improve the water quality and recreational activities associated with Scofield Reservoir. However, additional work could be accomplished provided the private land owners would allow these projects to move forward. There is a fair amount of money still available in the grant to implement fencing projects that would assure the protection of streambank stabilization already accomplished and provide protection against nutrient enrichment associated with the current agricultural practices. If we cannot accomplish this work this year, these monies will have to be returned to the federal government. Because of the deterioration of water quality in Scofield Reservoir coupled with the strong desire of residents in the area to restore recreation uses in the reservoir and assure a high quality drinking water source, it is not only untimely but unfortunate that these available federal funds cannot be utilized to implement projects which address these concerns.

Again the purpose of this letter is not only to point out this critical situation but to solicit support and cooperation from residents in the area to continue work this fall on the project. It is unfortunate that cooperative efforts funded through grant monies and local match contributions are failing to accomplished needed restoration. It may be necessary to implement ordinances if cooperative efforts fail to control nonpoint source pollution entering Scofield Reservoir.

Let us reaffirm our desire to find ways to utilize existing funds to improve water quality within Scofield Reservoir. If we can be of further assistance in this process please contact our office. We also extend our appreciation to you and to all agencies and individuals who have contributed positively to the completion of all projects for the improvement of water quality for this critical water resource.

Sincerely,

Don A. Ostler, P.E., Director
Bureau of Water Pollution Control

HLJ:pb

cc: Members, Pleasant Valley Committee

SCHOFIELD RESERVOIR
PHASE 1
314 CLEAN LAKES STUDY
1980-1982
UTAH DEPT. OF HEALTH

VARIOUS

SCOFIELD RESERVOIR

PHASE I

314 CLEAN LAKES STUDY

1980 - 1982

SLC
533-6146

Richard L. Denton
Project Officer

Myron I. Cox
Water Quality Specialist

LaVere B. Merritt, Ph.D.
Brigham Young University

UTAH DEPARTMENT OF HEALTH
James O. Mason, M.D., Dr.P.H.

DIVISION OF ENVIRONMENTAL HEALTH
Kenneth L. Alkema, Director

BUREAU OF WATER POLLUTION CONTROL
Calvin K. Sudweeks, Director

1983

The preparation of the report was made possible through a Grant (No. S008234-01) to the Utah Department of Health from the United States Environmental Protection Agency.

Point Source Pollution Discharges in the Scofield Reservoir Drainage Basin

There are five coal mines holding six NPDES permits in the Pleasant Valley Creek subbasin. Details concerning the permits are given in Table 1-10. Virtually all of the permits have identical requirements as given in Table 1-11.

Table 1-10. Point source inventory.

Name	NPDES #	Receiving Water
Blazon Company No. 1 Mine	UT-0023647	Pleasant Valley Creek
Coastal States Skyline Mine	UT-0023540	Eccles Creek
First Western Coal Co. Aletha # 1 Mine	UT-0023876	Scofield Reservoir
UCO, Inc. (Mine) Scofield Mine (Loadout)	UT-0023931 UT-0023990	Winter Quarters Creek Millers Creek
Valley Camp of Utah Bellina # 1 and 2 Mines	UT-0022985	Whiskey Creek to Eccles Creek

2177

Table 1-11. NPDES effluent requirements for Pleasant Valley Mines.

EFFLUENT CHARACTERISTIC	DISCHARGE LIMITATION			MONITORING REQUIREMENTS	
	Daily Average	7-Day Average b/	Daily Maximum	Measurement Frequency	Sample Type
Flow - M^3/Day, gpd	N/A	N/A	N/A	Monthly	Measured a/d/
Total Suspended Solids	25 mg/l	35 mg/l	70 mg/l	Monthly	Grab
Total Iron	N/A	N/A	2.0 mg/l c/	Monthly	Grab
Total Dissolved Solids	N/A	N/A	N/A e/	Monthly	Grab

Oil and Grease shall not exceed 10 mg/l and shall be monitored monthly by a grab sample.

The pH shall not be less than 6.5 standard units nor greater than 9.0 standard units and shall be monitored twice per month by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge of sanitary wastes.

See Schedule of Compliance. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At any point which is representative of each discharge prior to its mixing with the receiving stream and as indicated by the solid triangles on the current area maps submitted pursuant to Part III, A.1.

a/ See Part I, C.3.c.

b/ This limitation shall be determined by the arithmetic mean of a minimum of three (3) consecutive samples taken on separate days in a 7-day period (minimum total of three (3) samples).

c/ If any Iron analysis exceeds this limitation, the State of Utah and the permittee shall review the actions necessary to achieve compliance with the limitation and the continued appropriateness of the limitation. In no event shall the discharge exceed a daily maximum limitation for Total Iron of seven (7) milligrams per liter.

d/ For the intermittent discharges, the duration of the discharge shall be reported.

e/ The total amount of Total Dissolved Solids (TDS) discharged from all outfalls is limited to one ton (2,000 pounds) per day of TDS.

2177

SECTION 2

BASIN HYDROLOGY AND WATER QUALITY

Field Work

Field work for this study involved monitoring water quality and measuring flowrates at selected sampling stations in the basin. Samples were collected by Utah Division of Environmental Health personnel over a two year period beginning in September 1980, and analyzed at the Utah State Health Laboratory. Thirteen stream sampling sites were chosen. Six of these stations were established on major streams flowing directly into the reservoir; six were located along the upper reaches of Pleasant Valley Creek and its tributaries; and one station was set up on the Price River immediately downstream from Scofield Dam (see Figure 2-1). The sampling sites were selected with the objectives of acquiring information to isolate significant sources of pollutants, and monitoring their movement through the reservoir.

Determination of Flowrates

Estimates of typical monthly and annual flowrates were needed to define basin hydrology and compute pollutant loadings for nutrients and other constituents. These estimates were derived by compiling the limited study flowrate information and other available hydrologic records, delineating subbasins, and applying hydrologic principles to estimate runoff from each subbasin as described below.

Three U.S. Geological Survey (USGS) gaging stations provided longterm flow records for Price River, Fish Creek, and Gooseberry Creek, a tributary of Fish Creek. The USGS also supplied a hydrograph of daily flow during the 1981 water year for Pondtown Creek. The Division of Environmental Health personnel measured streams at sampling sites several times during the sampling period. In addition, the Utah Division of Water Resources (1978) combined USGS gaging station records, irrigation water depletions, and estimates of reservoir evaporation and precipitation to establish a water budget for the Upper Price River Basin (see Table 2-1). Their value was used as the best estimate of flow leaving the reservoir (45,066 ac ft/yr).

Scofield basin was then divided into thirteen subbasins as shown in Figure 2-2. Each subbasin was defined as the entire upstream area tributary to a stream sampling station and given the code designation of that station. The area of each subbasin was determined by planimetry.

The next step involved distributing the annual reservoir inflow among its six major tributaries. Fish Creek inflow was readily computed by subtracting diversions from Gooseberry Creek from the total flow measured for Fish Creek. Pondtown Creek flowrates were estimated by multiplying measured 1981 monthly flow rates by the ratio of average Fish Creek flows to 1981 Fish Creek flows. A similar method was used to establish Pleasant Valley Creek flowrates using flow data collected by the Division of Environmental Health during the sampling period.

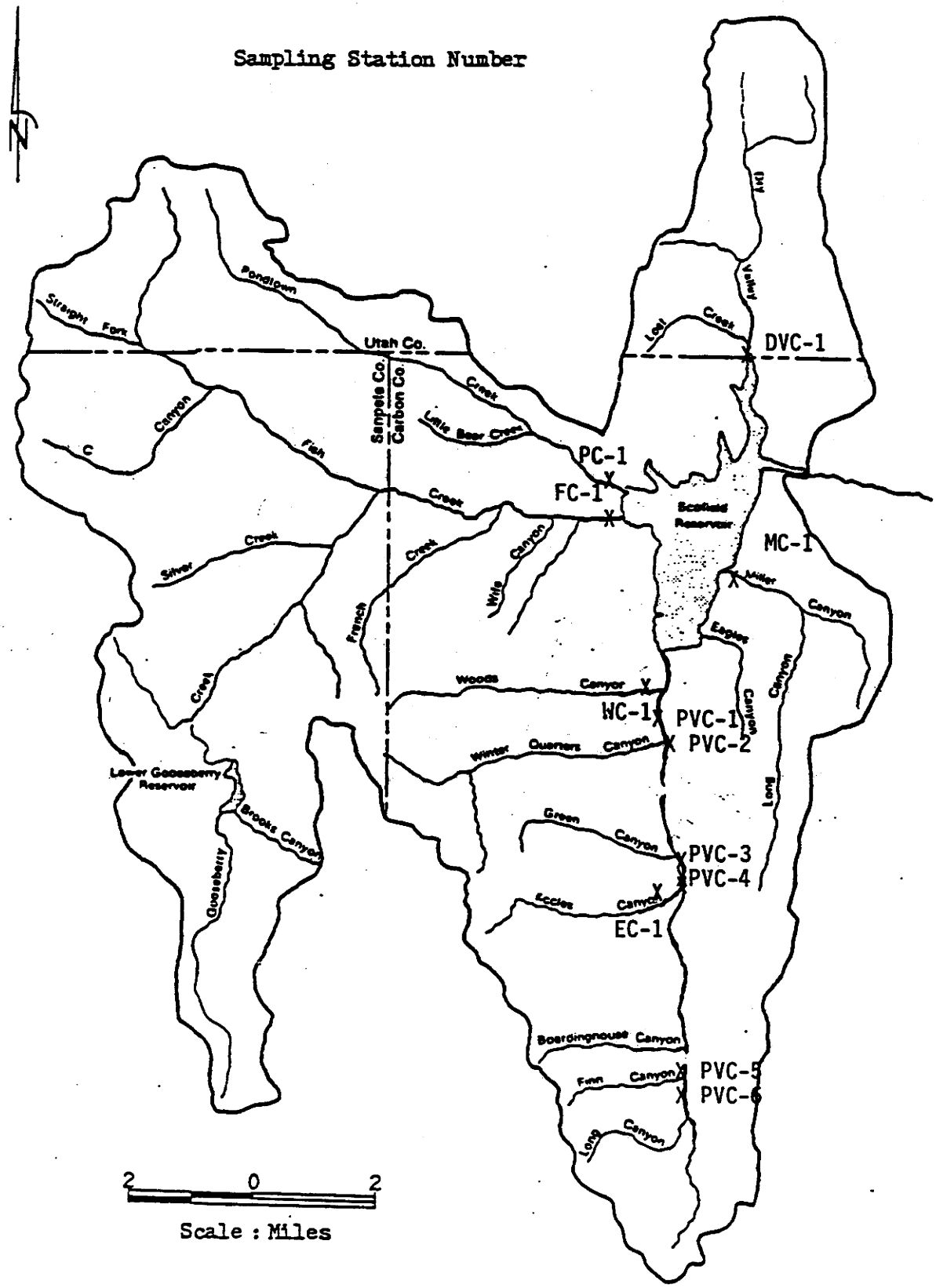


Figure 2-1. Stream Sampling Stations in the Scofield Basin.

Table 2-1. Water budget for the Upper Price River Basin.

	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	ANNUAL
Climatological Data													
Temperature °F	41.6	28.3	21.1	17.6	20.9	28.2	38.1	46.2	53.4	61.3	60.1	52.5	39.1
Precipitation inches	1.06	1.07	1.51	1.50	1.70	1.54	1.01	1.10	.62	1.17	1.38	1.06	14.72
Subarea Supply													
River Inflow													
Price River near Scofield	1,561	448	337	151	114	123	1,161	7,410	10,437	11,089	7,216	5,019	45,066
Tributary Inflow													
White River near Soldier Summit	243	218	200	188	198	559	3,011	7,336	2,055	679	333	246	15,266
Beaver Creek	62	54	58	57	60	103	326	1,319	723	195	69	47	3,073
Willow Creek	116	70	44	45	62	303	1,213	2,371	855	375	218	128	5,800
Ungaged	1,266	880	979	952	1,275	3,421	3,737	4,281	2,369	1,177	1,131	1,048	22,516
Exports													
Price City	260	260	240	215	215	250	260	315	350	350	350	335	3,400
Helper City	155	155	145	125	125	145	155	185	205	205	205	195	2,000
Groundwater Withdrawals													
Utah Power and Light Co. Wells	110	60						110	110	120	120	70	700
Subtotal	2,943	1,315	1,233	1,053	1,369	4,114	9,033	22,327	15,994	13,080	8,532	6,028	87,021
Cropland effective precipitation	61							64	36	68	80	61	370
Total Subarea Supply	3,004	1,315	1,233	1,053	1,369	4,114	9,033	22,391	16,030	13,148	8,612	6,089	87,391
Withdrawals (Diversions)													
Industrial													
Utah Power and Light	170	222	250	240	190	242	225	242	282	267	258	212	2,800
American Electric	35	35	35	35	35	35	35	35	35	35	35	35	420
Irrigation (@ 40% overall efficiency)	133							242	390	520	455	282	2,022
Total	338	257	285	275	225	277	260	519	707	822	748	529	5,242
Depletions (Consumptive Use)													
Industrial													
Utah Power and Light	170	222	250	240	190	242	225	242	282	267	258	212	2,800
American Electric	35	35	35	35	35	35	35	35	35	35	35	35	420
Irrigation	53							97	156	208	182	113	809
Total	258	257	285	275	225	277	260	374	473	510	475	360	4,029
Basin Outflow													
Surface													
Price river near Heiner	2,746	1,058	948	778	1,144	3,837	8,773	22,017	15,557	12,638	8,137	5,729	83,362

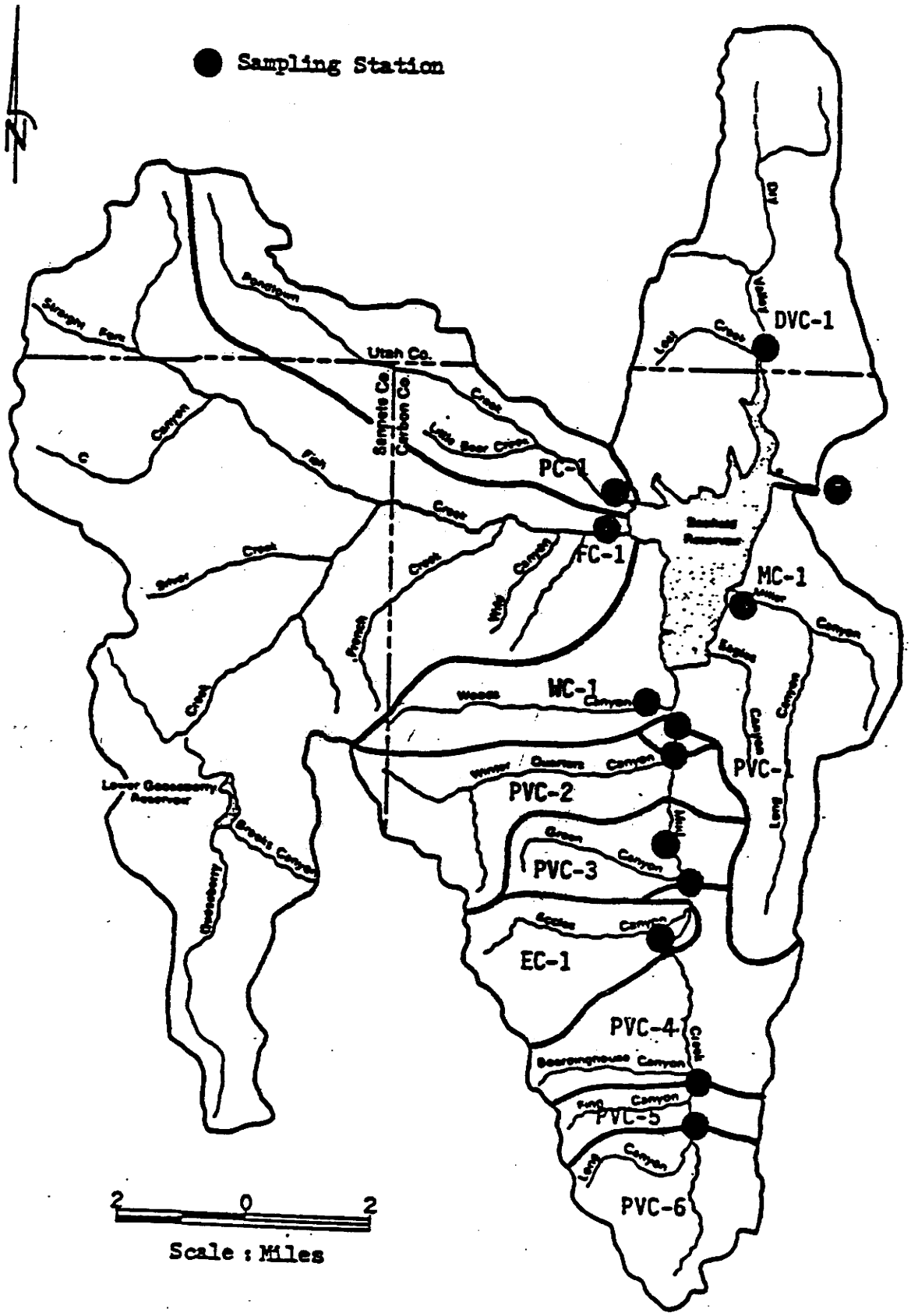


Figure 2-2. Stream sampling stations and designated subbasins in the Scofield Basin.

Dry Valley Creek and Miller Canyon Creek are located along the drier northern and eastern edge of the study basin. Both streams maintain a low, yet fairly constant, flow year-round with the exception of a moderate surge during spring run-off. Environmental Health personnel made estimates of base flows which were used to compute yearly flowrates. Annual discharge from Woods Canyon Creek was approximated using an area-flowrate correlation with Fish Creek. Estimates of average flowrates for upstream Pleasant Valley Creek sampling stations were derived using area-discharge relationships from nearby streams with known discharges and similar drainage basin topography. Resulting flowrates for all the stations are given in Table 2-2 and 2-3.

The Utah Water Research Laboratory (Clyde, et al., 1981) has estimated that groundwater enters the reservoir through alluvial deposits in Pleasant Valley (the basin's largest and most productive aquifer) at a rate of 14.7 acre-feet per year. This value is negligible compared to annual surface inflow. Seepage losses from the reservoir are unknown but thought to be small. Therefore, groundwater flow was assumed negligible in the hydrologic budget.

In a typical year the five major streams discharge 49,317 acre-feet of water into Scofield Reservoir. Direct precipitation supplies an additional 2,888 acre-feet to the reservoir giving a total annual inflow of 52,205 acre-feet. Approximately 5,728 acre-feet evaporate from the reservoir surface and 46,477 ac ft/yr are released into the Price River. The overall water budget is given in Table 2-4.

Water Quality in the Streams

Water quality concentrations for the various constituents were developed from data collected on streams in the watershed over a two year period beginning in September 1980.

Sampling points had been chosen earlier as the key points in monitoring and identifying the pollutant loadings in the subbasins. A summary of water quality in the basin streams is given in Table 2-5. A complete listing of the water quality data is available upon request from the State Division of Environmental Health.

A review of the water quality data indicates that the waters are generally of good quality. Based on flow-weighted averages and excluding the Price River we see a low Total Dissolved Solids (TDS), ranging from about 200 mg/l to 300 mg/l; moderate alkalinity ranging from about 150 mg/l to 220 mg/l; and moderate hardness, ranging from about 190 mg/l to 290 mg/l. Total Suspended Solids (TDS) values are occasionally quite high, especially during spring runoff or heavy sumer rainstorms. Total phosphorus concentrations are quite high, ranging from 0.07 mg/l to 0.34 mg/l. Nitrogen species are moderately low with Total Kjeldahl Nitrogen (TKN) below 1.0 mg/l, ammonia (NH_3) below 0.06 mg/l, and nitrate (NO_3) below 0.60 mg/l.

Table 2-2. Average flowrates for streams in the Scofield Basin (ac/ft).

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
FC-1	511	477	715	3,343	16,269	7,859	1,859	946	643	674	633	588	34,487
Pontown Cr. PC-1 CFS =	44 0.717	48 0.866	91 1.483	230 3.872	1,420 23.135	688 11.582	71 1.157	60 0.978	55 0.925	51 0.831	48 0.808	45 0.733	2,851 3.945
PVC-1	282	273	337	559	5,083	597	199	142	151	240	288	290	8,441
Woods Canyon WC-1 CFS =	21 0.342	19 0.342	28 0.456	65 1.09	480 7.820	270 4.545	33 0.538	29 0.472	27 0.455	26 0.423	23 0.387	22 0.358	1,043
MC-1	25	23	31	53	149	81	42	35	31	30	28	26	554
DVC-1	33	32	36	170	321	136	41	36	35	34	34	33	941
Pleasant Valley PVC-6	63	60	76	112	1,055	176	94	76	780	69	66	65	1,982
PVC-5	81	78	97	141	1,315	217	120	97	86	84	83	84	2,483
PVC-4	182	175	216	316	2,867	462	266	217	193	191	186	187	5,458
PVC-3	188	181	173	326	2,958	477	275	223	200	198	192	193	5,633
PVC-2	287	276	342	495	4,405	698	421	344	303	313	293	295	8,473
EC-1	43	41	51	76	679	108	64	53	45	45	44	44	1,293
SW-1	Monthly distribution not estimated.												1,000
PR-1	151	114	123	1,161	7,410	10,437	11,089	7,216	5,019	1,561	448	337	46,477

Table 2-3. Scofield Reservoir watershed subbasin areas and annual flowrates.

Station No.	Name	Subbasin Area[a] (Acres)	Annual Flow (ac ft/yr)	Location
1	FC-1	41,600	34,487	Fish Creek above Scofield Res.
2	PC-1	7,750	2,851	Pondtown Creek above Scofield Res.
3	PVC-1	22,690	8,441	Pleasant Valley Cr. above Scofield Res.
4	WC-1	3,370	1,043	Woods Canyon Cr. above Pleasant Cr. Confluence
5	MC-1	5,250	554	Miller Canyon Creek above Scofield Res.
6	DVC-1	8,070	941	Dry Valley Cr. above Scofield Res.
7	PVC-6	3,470	1,982	Pleasant Valley Cr. above Clear Cr.
8	PVC-5	5,110	2,483	Pleasant Valley Cr. below Clear Cr.
9	PVC-4	14,140	5,458	Pleasant Valley Cr. above Valley Camp
10	PVC-3	16,210	5,633	Pleasant Valley Cr. below Valley Camp
11	PVC-2	21,750	8,473	Pleasant Valley Cr. above Scofield Town
12	EC-1	3,460	1,293	Eccles Canyon Cr. above Pleasant Cr. Confluence
13	SW-1	6,700	1,000	Direct Runoff (ungaged) from the Lake Shoreline
14	PR-1	98,410	46,477	Price River below Scofield Res.

[a] All drainage area tributary to each station, see Figure 2-1 for locations.

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Table 2-4. Annual water budget for Scofield Reservoir.

		Ac Ft.
INFLOW		
Tributaries:	Fish Creek	34,487
	Pleasant Valley Creek	8,441
	Pondtown Creek	2,851
	Woods Canyon Creek	1,043
	Dry Valley Creek	941
	Miller Creek	554
Shoreline Wash		1,000
Subtotal		49,317
Precipitation:	(16.1 in/yr)[a]	2,888
Total Inflow:		52,205
OUTFLOW		
Deletion[b]		1,411
Discharge:	Price River	45,066
Evaporation:	(24.5 in/yr)[c]	5,728
Total Outflow:		52,205

a Water Resources 1978

b Recent additional outflow. Used in Pleasant Valley for irrigation and mining.

c This approximate value was estimated by study personnel and should not be used as data values since detailed investigations were not made on this component.

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Table 2-5. Water quality summary for Scofield Reservoir tributaries.

STATION		Temp. °C	DO mg/l	pH units	Alk mg/l	PO_4-P mg/l	TP-P mg/l	NH_3-N mg/l	NO_3-N mg/l	TKN-N mg/l
		Water Quality Parameter								
DVC-01	A. Avg.[a]	8.8	7.8	8.0	179	0.050	0.12	0.03	0.07	0.36
	Wght. Avg.[b]	9.1	7.7	7.8	173	0.047	0.11	0.03	0.08	0.39
	Min.	5.2	5.6	7.5	66	0.020	0.05	0.03	0.00	0.20
	Max.	16.2	9.1	8.9	235	0.070	0.25	0.05	0.13	0.60
	Stnd. Dev.	4.4	1.3	0.6	66	0.019	0.08	0.01	0.05	0.15
FC-01	A. Avg.	11.3	8.5	8.3	166	0.019	0.05	0.06	0.23	0.36
	Wght. Avg.	9.2	8.5	8.2	175	0.028	0.07	0.05	0.28	0.44
	Min.	0.1	4.5	8.0	134	0.002	0.00	0.03	0.00	0.05
	Max.	22.0	12.3	8.6	200	0.100	0.15	0.20	0.95	0.90
	Stnd. Dev.	6.6	1.9	0.2	19	0.022	0.04	0.04	0.23	0.22
MC-01	A. Avg.	12.3	7.6	8.1	222	0.052	0.13	0.04	0.35	0.83
	Wght. Avg.	12.6	7.0	8.1	221	0.051	0.14	0.04	0.40	0.96
	Min.	6.8	6.0	7.9	192	0.005	0.05	0.03	0.00	0.50
	Max.	22.0	11.3	8.4	261	0.180	0.30	0.05	1.00	2.10
	Stnd. Dev.	4.3	1.6	0.2	20	0.057	0.09	0.01	0.30	0.51
PC-01	A. Avg.	11.7	8.3	8.2	201	0.028	0.08	0.06	0.26	0.34
	Wght. Avg.	10.5	7.9	8.2	194	0.046	0.08	0.06	0.43	0.37
	Min.	0.1	3.7	7.6	171	0.002	0.01	0.03	0.00	0.10
	Max.	22.2	12.5	8.5	244	0.140	0.60	0.30	1.40	0.80
	Stnd. Dev.	6.6	1.7	0.2	18	0.033	0.11	0.06	0.32	0.15

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Table 2-5. Continued

STATION		Temp. °C	DO mg/l	pH units	Alk mg/l	PO_4-P mg/l	TP-P mg/l	NH_3-N mg/l	NO_3-N mg/l	TKN-N mg/l
		Water Quality Parameter								
PVC-01	A. Avg.	10.5	8.3	8.3	191	0.044	0.13	0.05	0.26	0.38
	Wght. Avg.	8.3	8.1	8.3	177	0.074	0.24	0.05	0.41	0.58
	Min.	0.1	4.7	8.0	130	0.002	0.01	0.03	0.00	0.10
	Max.	24.3	12.4	8.6	264	0.280	1.10	0.20	2.97	1.80
	Stnd. Dev.	7.1	1.6	0.2	33	0.063	0.20	0.03	0.51	0.30
WC-01	A. Avg.	12.4	6.7	8.2	195	0.051	0.13	0.06	0.28	0.49
	Wght. Avg.	11.5	7.2	8.3	181	0.082	0.23	0.04	0.43	0.63
	Min.	4.9	2.9	7.1	146	0.002	0.00	0.03	0.00	0.05
	Max.	23.8	11.3	8.4	254	0.280	0.67	0.20	1.37	1.40
	Stnd. Dev.	6.5	2.0	0.3	30	0.074	0.17	0.04	0.33	0.36
PVC-02	A. Avg.	10.7	7.9	8.2	195	0.032	0.12	0.04	0.26	0.49
	Wght. Avg.	10.2	8.0	8.3	189	0.045	0.14	0.04	0.45	0.57
	Min.	0.1	4.8	8.0	120	0.005	0.00	0.03	0.00	0.10
	Max.	23.0	11.7	8.3	261	0.170	0.45	0.05	0.97	1.60
	Stnd. Dev.	7.3	1.6	0.1	36	0.043	0.13	0.01	0.29	0.40
PVC-03	A. Avg.	10.6	7.9	8.2	200	0.055	0.17	0.05	0.24	0.39
	Wght. Avg.	9.5	8.0	0.2	195	0.056	0.18	0.05	0.38	0.53
	Min.	0.7	4.6	8.0	151	0.002	0.00	0.03	0.00	0.10
	Max.	21.5	11.5	8.3	259	0.480	1.10	0.10	0.17	1.80
	Stnd. Dev.	6.4	1.6	0.1	31	0.105	0.25	0.02	0.31	0.34

Table 2-5. Continued

Water Quality Parameter

STATION		Temp. °C	DO mg/l	pH units	Alk mg/l	PO_4-P mg/l	TP-P mg/l	NH_3-N mg/l	NO_3-N mg/l	TKN-N mg/l
	A. Avg.	10.1	8.0	8.2	199	0.040	0.15	0.04	0.26	0.35
	Wght. Avg.	9.3	8.0	8.2	194	0.048	0.17	0.04	0.45	0.34
PVC-04	Min.	1.4	4.7	8.1	151	0.002	0.00	0.03	0.00	0.05
	Max.	21.0	12.4	8.3	256	0.260	0.56	0.10	1.23	1.40
	Stnd. Dev.	5.6	1.7	0.1	32	0.063	0.17	0.02	0.33	0.28
	A. Avg.	10.1	8.1	8.2	193	0.055	0.20	0.04	0.29	0.44
	Wght. Avg.	8.7	8.4	8.2	184	0.108	0.34	0.05	0.59	0.52
EC-01	Min.	1.6	4.4	7.9	154	0.002	0.00	0.00	0.00	0.05
	Max.	21.0	12.4	8.3	238	0.370	0.87	0.10	1.40	1.30
	Stnd. Dev.	5.3	2.0	0.1	25	0.092	0.25	0.02	0.36	0.35
	A. Avg.	8.5	7.8	8.1	208	0.053	0.12	0.08	0.34	0.38
	Wght. Avg.	8.9	7.6	8.3	198	0.075	0.13	0.05	0.41	0.48
PVC-05	Min.	2.5	6.8	7.5	131	0.005	0.04	0.03	0.00	0.05
	Max.	17.6	12.0	8.3	284	0.180	0.26	0.30	1.20	1.00
	Stnd. Dev.	3.8	2.2	0.2	45	0.039	0.05	0.08	0.27	0.24
	A. Avg.	9.0	8.2	8.3	158	0.034	0.09	0.07	0.25	0.49
	Wght. Avg.	7.3	8.2	8.3	154	0.045	0.10	0.05	0.28	0.57
PVC-06	Min.	0.1	4.8	7.8	120	0.010	0.03	0.03	0.00	0.10
	Max.	19.7	12.7	8.6	194	0.140	0.30	0.60	0.85	0.90
	Stnd. Dev.	6.2	1.8	0.2	26	0.030	0.07	0.13	0.27	0.22

Table 2-5. Continued

STATION		Temp. °C	DO mg/l	pH units	Alk mg/l	PO_4-P mg/l	TP-P mg/l	NH_3-N mg/l	NO_3-N mg/l	TKN-N mg/l
		Water Quality Parameter								
PR-1	A. Avg.	11.6	7.6	8.3	155	0.018	0.05	0.08	0.27	0.53
	Wght. Avg.	11.4	8.4	8.3	145	0.016	0.05	0.06	0.29	0.52
	Min.	0.2	4.7	7.9	132	0.005	0.00	0.03	0.00	0.10
	Max.	19.4	11.7	8.5	180	0.080	0.20	0.30	1.04	1.40
	Stnd. Dev.	5.6	1.6	0.2	13	0.017	0.05	0.06	0.26	0.26

a The arithmetic average includes all data at equal weight in the average.
b The flow weighted average is calculated by using the arithmetic monthly average for all data in each month and then using these monthly values and the monthly flowrate values to calculate a flow-weighted, annual weighted value.

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Benthos

Pleasant Valley Creek and Fish Creek are the major tributaries and were selected for limited benthos studies. Stream benthos in Pleasant Valley Creek and Fish Creek indicate systems of good water quality. Taxa indicative of good water quality, such as Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies), are well represented in benthos samples. The diversity in both streams is similar but the mean number per square meter is much greater in Pleasant Valley Creek probable due to greater amounts of organic matter. Although both systems tranport large sediment loads during runoff, they apparently are not too detrimental to the benthic biota. The taxonomic identification, mean numbers and statistical analysis of data is included in Appendix B.

Loading Rates

Water quality concentrations were plotted as shown in Figure 2-3. These plots gave a feel for the shape of the curves and yearly variations encountered in the nearly two years of data collected. A smoothed trend curve was then fit by eye to give the best estimate of the "typical" year. Curves for total phosophorus, othophosphorus, inorganic nitrogen, Total Kjeldahl nitrogen and total suspended solids were thus developed.

Pollutant loadings were then calculated by multiplying the mean monthly flowrates by the mean quality values taken from the trend curves. This approach was used to smooth out the data and thus moderate atypical data values. Monthly loadings were summed for the year for each station and each of the constituents to give annual pollutant loading rates. These are summarized in Tables C-1 through C-6 given in Appendix C. These values were also used in the assessment of nonpoint loadings which are discussed in the next section.

Stream Fisheries

The following information was supplied by the Utah Division of Wildlife Resources.

Fish Creek. Fish populations include rainbow and cutthroat trout. The stream habitat supports excellent spawning, rearing, and residency requirements for trout. Many adult reservoir trout run this stream each spring during the spawning phase.

Pondtown Creek. Fish populations include rainbow and cutthroat trout. The stream habitat supports good trout spawning and rearing requirements, but only fair requirements for residency. This stream is also used in the spring for spawning by adult trout from Scofield Reservoir.

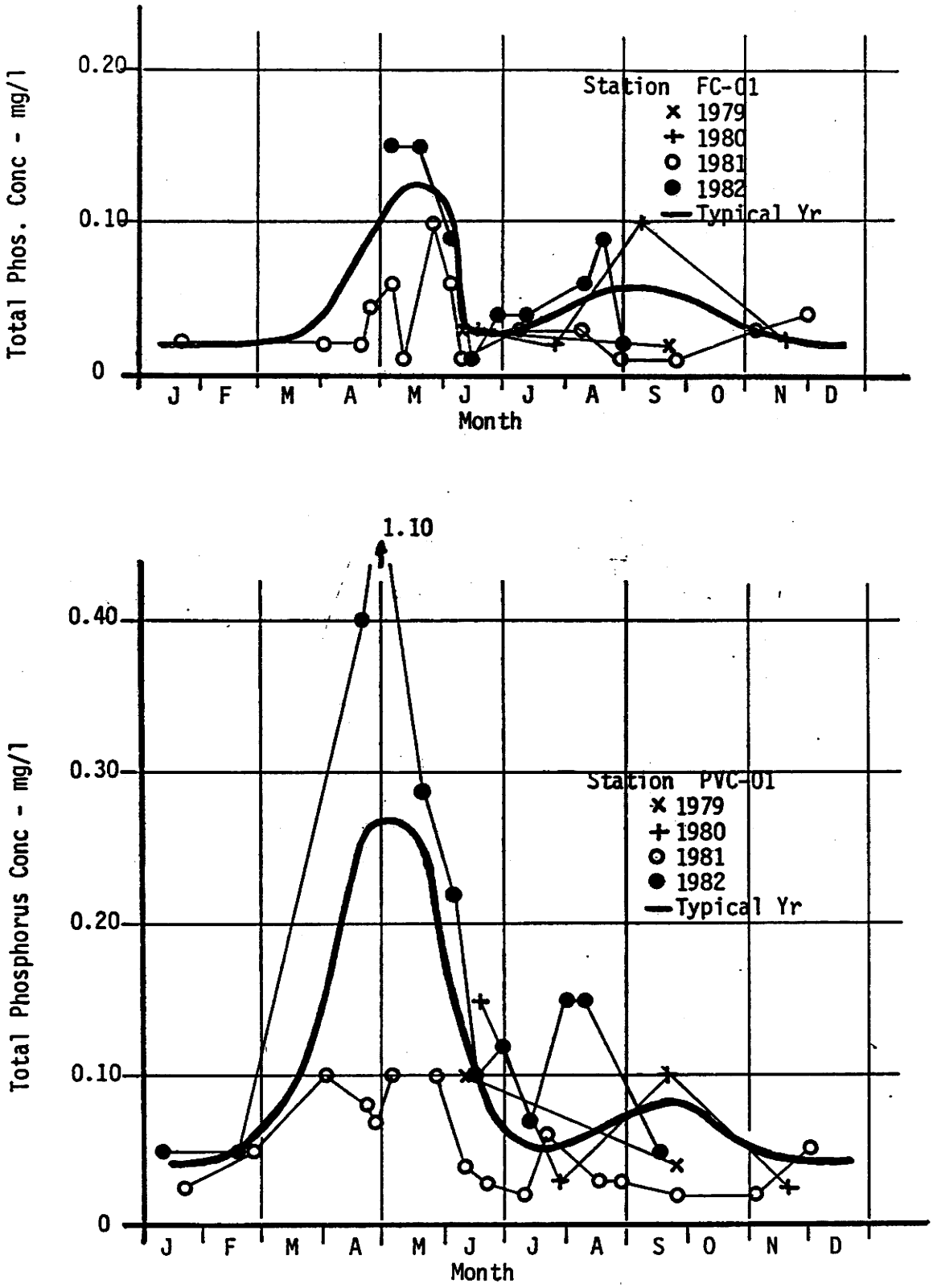

Figure 2-3. Total Phosphorus in Fish Cr. and Pleasant Valley Creek.

Dry Valley Creek. Fish populations are limited to the confluence area at the reservoir, and may include rainbow and cutthroat trout. No other data is available on habitat quality. Populations are limited mainly by minimum flow.

Miller Canyon Creek. Fish population is mainly fingerling cutthroat trout up to the road culvert only. The habitat requirements are suitable for trout rearing through the end of June. Populations are limited mainly by minimum flow.

Woods Canyon Creek. Fish populations are mainly cutthroat and rainbow trout. Both species utilize the stream for spawning in high densities during spring migration from the reservoir.

Pleasant Valley Creek. Fish populations are mainly cutthroat trout, with rainbow trout in limited numbers. Stream habitat is mainly geared to rearing and residency requirements. The stream contains natural trout populations along with spring spawners migrating from the reservoir. Several diversions on the creek, along with livestock overgarzing in the riparian zone, have proven detrimental to the trout.

Eccles Creek. The fish population is cutthroat trout. The habitat serves mainly as a spawning and rearing area for Pleasant Valley Creek. Few trout over 12 inches occur in this small stream. Recent detrimental impacts (siltation and coalfines from road construction and coal mining) have severely reduced trout populations in the creek.

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Winter Quarters Canyon
Data Adequacy

October 1992

CHEMICAL AND PHYSICAL CHARACTERISTICS OF WATER & SEDIMENT IN SCHOFIELD RESERVOIR USGS WATER SUPPLY PAPER 2247

Chemical and Physical Characteristics of Water and Sediment in Scofield Reservoir, Carbon County, Utah

1.50

United States Geological Survey Water-Supply Paper 2247

Prepared in cooperation with the U.S. Bureau of Land Management

Chemical and Physical Characteristics of Water and Sediment in Scofield Reservoir, Carbon County, Utah

By K. M. Waddell, D. W. Darby, *and* S. M. Theobald

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U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2247

DEPARTMENT OF THE INTERIOR
DONALD PAUL HODEL, *Secretary*

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Chemical and Physical Characteristics of Water and Sediment in Scofield Reservoir, Carbon County, Utah

By K.M. Waddell, D.W. Darby, *and* S.M. Theobald

Abstract

Evaluations based on the nutrient content of the inflow, outflow, water in storage, and the dissolved-oxygen depletion during the summer indicate that the trophic state of Scofield Reservoir is borderline between mesotrophic and eutrophic and may become highly eutrophic unless corrective measures are taken to limit nutrient inflow.

Sediment deposition in Scofield Reservoir during 1943–79 is estimated to be 3,000 acre-feet, and has decreased the original storage capacity of the reservoir by 4 percent. The sediment contains some coal, and age dating of those sediments (based on the radioisotope lead-210) indicates that most of the coal was deposited prior to about 1950.

Scofield Reservoir is dimictic, with turnovers occurring in the spring and autumn. Water in the reservoir circulates completely to the bottom during turnovers. The concentration of dissolved oxygen decreases with depth except during parts of the turnover periods. Below an altitude of about 7,590 feet, where 20 percent of the water is stored, the concentration of dissolved oxygen was less than 2 milligrams per liter during most of the year. During the summer stratification period, the depletion of dissolved oxygen in the deeper layers is coincident with supersaturated conditions in the shallow layers; this is attributed to plant photosynthesis and bacterial respiration in the reservoir.

During October 1, 1979–August 31, 1980, the discharge-weighted average concentrations of dissolved solids was 195 milligrams per liter in the combined inflow from Fish, Pondtown, and Mud Creeks, and was 175 milligrams per liter in the outflow (and to the Price River). The smaller concentration in the outflow was due primarily to precipitation of calcium carbonate in the reservoir—about 80 percent of the decrease can be accounted for through loss as calcium carbonate.

The estimated discharge-weighted average concentration of total nitrogen (dissolved plus suspended) in the combined inflow of Fish, Pondtown, and Mud Creeks was 1.1 milligrams per liter as nitrogen. The load of total nitrogen contributed by each stream was about proportional to the quantity of water contributed by the respective stream.

For the combined inflow of Fish, Pondtown, and Mud Creeks, the discharge-weighted average concentration of total phosphorus was 0.06 milligram per liter as phosphorus. Percentages of the total phosphorus load contributed by Mud and Pondtown Creeks were significantly larger than their percentages of the total inflow. During October 1, 1979–August 31, 1980, Fish Creek contributed 72 percent of the inflowing water but only 60 percent of the total phosphorus load, Mud Creek contributed 16 percent of the total inflow but 24 percent of the total phosphorus load, and Pondtown Creek contributed 6 percent of the total inflow and 16 percent of the load of total phosphorus.

Eccles Canyon is a major contributor of nutrients to Mud Creek, and most of the nutrient load occurs in the form of suspended organic material. During the snowmelt period, concentrations of total nitrogen and phosphorus were as much as 21 and 4.3 milligrams per liter at the gaging station in Eccles Canyon. The unusually large concentrations of nitrogen and phosphorus probably have resulted from flushing of residual debris from the canyon—about 27.3 acres of forested land were cleared during 1979 for fire protection around new mine portals and for road rights-of-way.

The concentrations of trace metals in the sediments near the inflow of Mud Creek are not greatly different from those in the middle of the reservoir, which suggests that sediments related to coal mining either have not affected the trace-metal concentrations in the sediments or, particularly for the fine-grained sediments, have been uniformly distributed over the reservoir bottom. The concentration of total extractable mercury in the sediments ranged from 0.08 to 0.20 part per million near the inflow of Mud Creek and from 0.08 to 0.46 part per million at a site near the middle of the reservoir. Virtually all the mercury is silica bound, which is the least soluble fraction. The maximum concentration of mercury in the nondetrital and easily soluble fraction was 0.02 part per million at both sites.

INTRODUCTION

Location and Physical Characteristics of Reservoir

Scofield Dam is located on the Price River downstream from the confluence of Fish and Mud Creeks; it is about 5 miles north of the town of Scofield and 22 miles northwest of Price city in east-central Utah (fig. 1). The dam is formed by earth and rockfill, and is rock faced; it is 800 feet downstream from an older dam, which was in use from May 1926 to November 8, 1945. The present dam impounds water for public supply and irrigation in the Price city area 20 to 30 miles southeast of the dam; it also provides for flood protection and recreation. The present reservoir inundates the downstream channels of Fish, Mud, and Pondtown Creeks—the principal sources of reservoir inflow—and all the storage is released to the Price River. The pool altitude at maximum storage is 7,617.5 feet[1] and the usable storage capacity between the altitudes of 7,617.5 and 7,586.0 feet is 63,400 acre-feet. The pool altitude of dead storage is 7,586.0 feet, and the quantity of water in dead storage is 6,000 acre-feet. The deepest part of the reservoir at maximum pool altitude is 47 feet.

Purpose and Objectives of Study

Underground coal mining has expanded in the Mud Creek drainage during the past few years and is expected to begin in the Pondtown Creek drainage during the next few years. The expanded mining activities may affect the quality of water entering and leaving Scofield Reservoir, as well as that stored in the reservoir. The effects may include (1) increased fluvial sediment resulting from clearing of forest land, and (2) water-quality deterioration caused by increased consumptive use of water, mine drainage, and local contamination from inadequate sewage-treatment facilities.

The U.S. Geological Survey, in cooperation with the U.S. Bureau of Land Management, conducted a study from September 1979 to August 1980 to assess the chemical and physical characteristics of water and sediment in Scofield Reservoir. The primary objectives of the study were to determine (1) if anaerobic conditions occurred seasonally in the reservoir, (2) the quantity and source of nutrient loading, (3) the concentration and distribution of trace metals in the water and sediment, (4) the quantity of sediment deposition prior to 1979 and average sediment accumulation rates, (5) accurate bathymetric profiles that can be used to assess future rates of sediment deposition, and (6) the need for additional study or monitoring, or both.

Methods of Investigation

Water-quality data were collected during the 1980 water year for inflowing streams, for the reservoir, and for outflow from the reservoir (fig. 2). The data collected during this study are presented either in this report or in Waddell and others (1982). For inflowing streams, the data collection was concentrated during periods of high and low flows so that total loads could be estimated for selected constituents, including nutrients and major ions. For the reservoir, chemical and physical data were collected during September and October 1979 and August 1980, so that the change in storage of major ions and of nitrogen and phosphorus could be computed for the 11 month period, October 1, 1979, to August 31, 1980. Collection of chemical and physical data for water in the reservoir included in situ measurements of temperature, dissolved oxygen, pH, and specific conductance at 18 sites; and chemical analyses to determine concentrations of major inorganic ions, trace metals, and nutrients at 9 sites. Chemical and physical data for bottom sediments, collected during September and October 1979 and August 1980, included distribution of selected metals in the silicate, nonsilicate, and nondetrital sediment phases; bathymetric profiles to determine net sediment deposition since 1943; and determination of the age of sediments by use of lead-210. More detailed explanation of the data collection and analytical methods are given in subsequent sections of the report, where appropriate to the subject.

A portable water-quality instrument (Martek, Model II[2]) was used to make in situ measurements of temperature, dissolved oxygen, specific conductance, and pH. A fathometer was used to make the bathymetric profiles. Core samples of bottom sediments were collected in 2-inch-diameter PVC tubes. The samples were collected by placing the tubes in weighted collars, which were secured to a cable issuing from a reel mounted on a boat. The tubing and weighted collar assembly was lowered to within 5 to 10 feet of the lake bottom and released. The core samples ranged from 30 to 41 centimeters in length.

[1]The National Geodetic Vertical Datum of 1929 (NGVD of 1929) is a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada. It was formerly called mean sea level. NGVD of 1929 is referred to as sea level in this report.

[2]The use of the brand names used in this report are for identification purposes only and does not constitute endorsements by the U.S. Geological Survey.

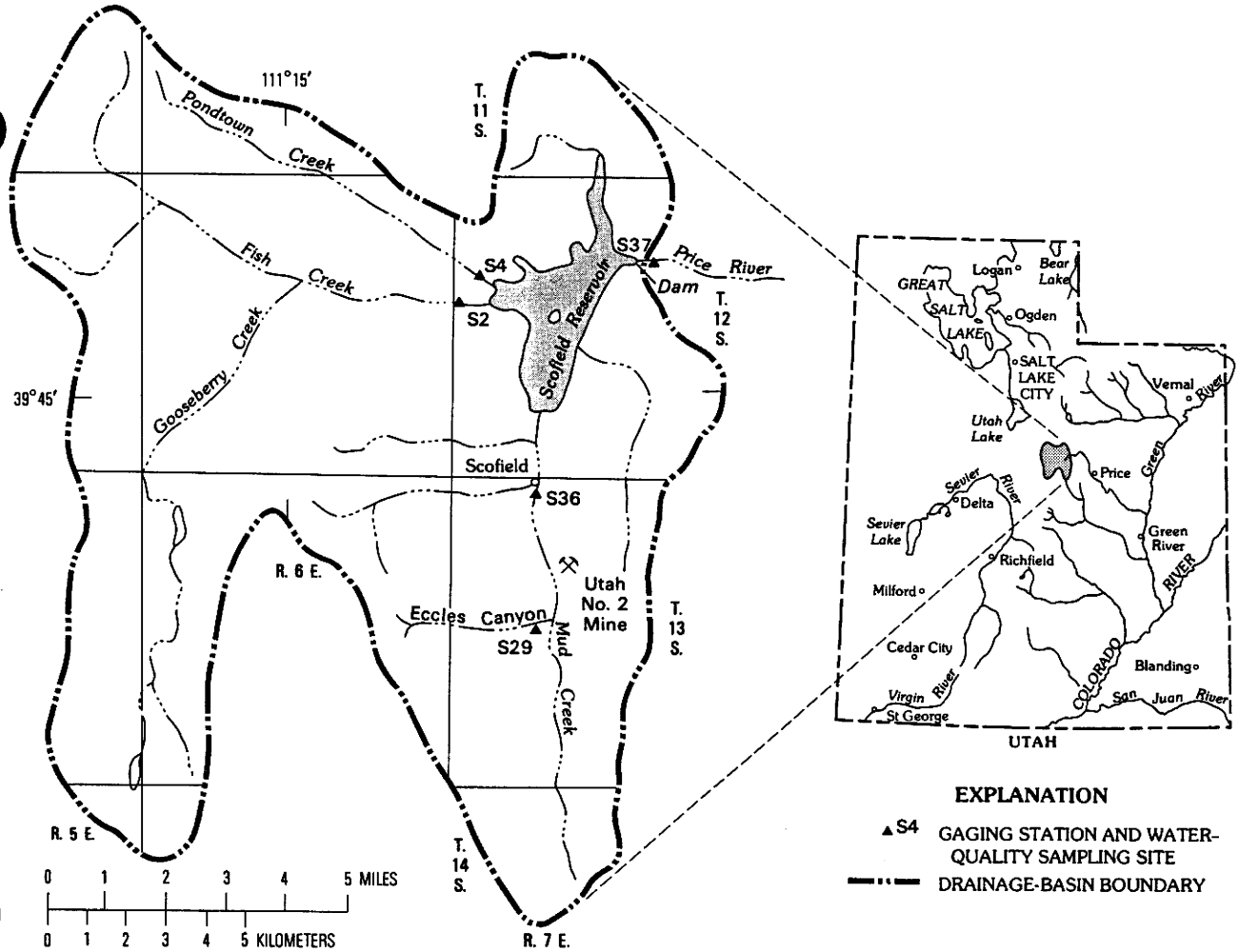

Figure 1. Location of the Scofield Reservoir drainage basin and gaging stations and water-quality sampling sites on streams.

Acknowledgments

The cooperation and assistance of the U.S. Bureau of Reclamation, which provided bathymetric maps prepared during 1943, and the Utah Division of Wildlife Resources, which provided docking facilities for boats as well as accommodations at camping facilities, are appreciated.

INFLOW TO RESERVOIR

During the first 11 months of the 1980 water year, Fish Creek contributed 72 percent; Pondtown Creek, 6 percent; and Mud Creek, 16 percent of the inflow to Scofield Reservoir (table 1). Precipitation on the reservoir, inflow from other small tributaries (unmeasured), and ground-water seepage contributed the remaining 6 percent of the inflow. Records of discharge for Fish Creek upstream from the reservoir (site S2, fig. 2) and the Price River downstream from the reservoir (site S37) during the 1938–70 water years indicate that the flow of Fish Creek averages about 75 percent of the total inflow to the reservoir. Thus, the percent of inflow contributed by Fish Creek during the 11 months of the 1980 water year was approximately the same as the long-term average.

The flow of Fish, Pondtown, and Mud Creeks fluctuates seasonally and usually is largest during snowmelt runoff. During the 1938–81 water years, 80 percent of the flow of Fish Creek, at site S2, occurred during April, May, and June (fig. 3), the period of snowmelt runoff.

Total inflow to the reservoir during the 1980 water year was greater than average. During the 1938–81 water years, the average flow of Fish Creek (site S2, fig. 2) was 34,200 acre-feet per year. During the 1980 water year, the flow of Fish Creek was 61,700 acre-feet or about 180 percent of average. Because the percent of inflow contributed by Fish Creek during the 1980 water year was near that of the long-term average, it was concluded that inflow from other streams to Scofield Reservoir during the 1980 water year (and study period) was about 180 percent of average.

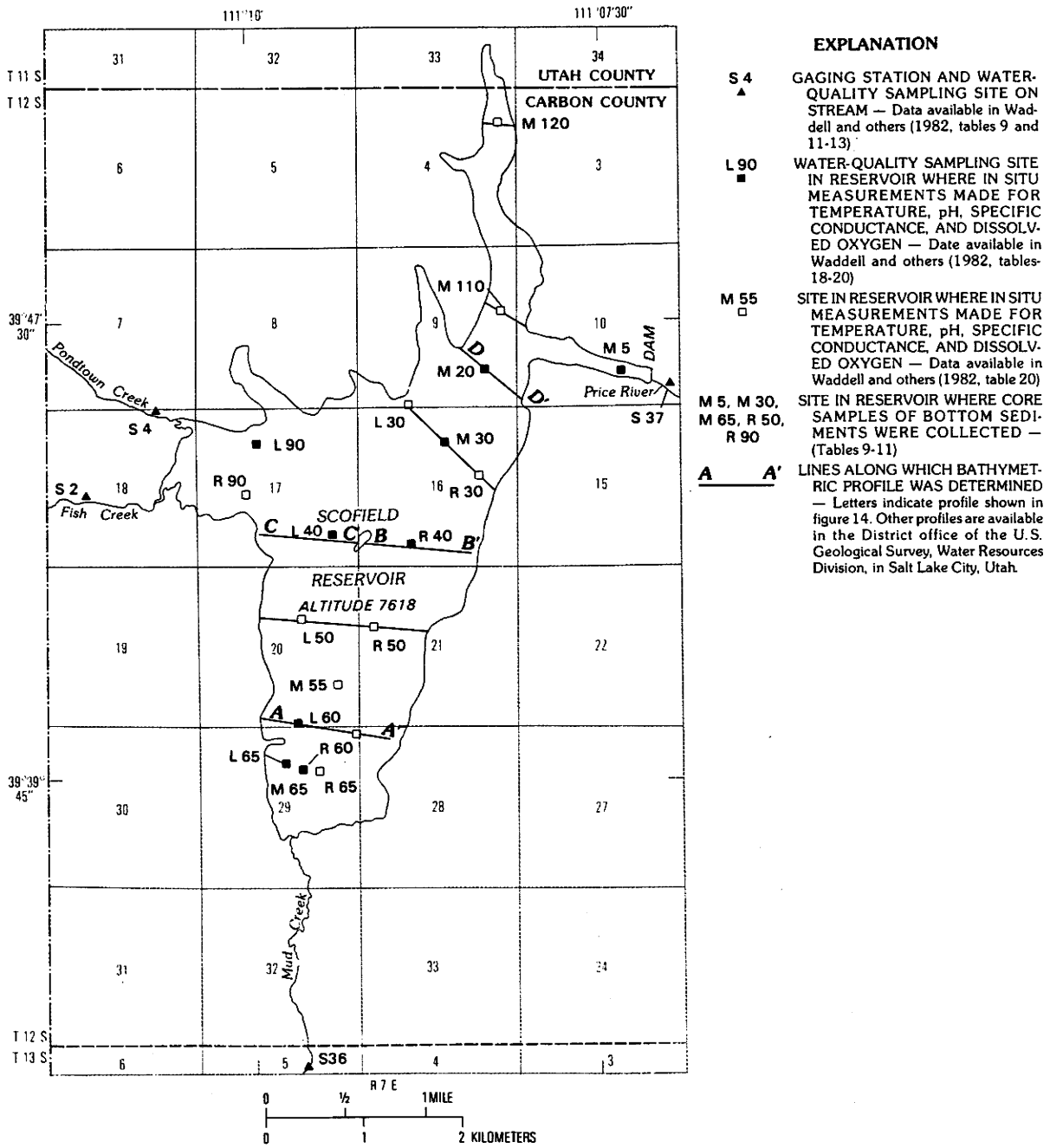

Figure 2. Scofield Reservoir area showing location of water-quality and core sampling sites and bathymetric profiles.

near that of the long-term average, it was concluded that inflow from other streams to Scofield Reservoir during the 1980 water year (and study period) was about 180 percent of average.

CHEMICAL CHARACTERISTICS OF RESERVOIR INFLOW AND OUTFLOW

The chemical characteristics of the inflow and outflow of Scofield Reservoir were evaluated from October 1, 1979, to August 31, 1980. The chemical characteristics included in the evaluation were (1) dissolved major ions, (2) dissolved and suspended nitrogen and phosphorus, and (3) dissolved trace metals.

Dissolved Major Ions

For inflow from Fish, Pondtown, and Mud Creeks, the predominant dissolved ions were calcium and bicarbonate (fig. 4). Most of the water from these streams is at or near saturation with respect to the minerals calcite and aragonite.

Table 1. Stream inflow and reservoir outflow (Price River) of nitrogen, phosphorus, and dissolved solids, October 1, 1979–August 31, 1980

[Site: See figure 1 for location]

Site		Volume (acre-ft)	Percent of inflow	Nitrogen (tons)			Percent of inflow of total nitrogen	Phosphorus (tons)			Percent inflow of total phosphorus	Dissolved solids (tons)	Percent inflow of dissolved solids
				Dissolved	Suspended	Total		Dissolved	Suspended	Total			
						Inflow							
S2	Fish Creek	60,760	72	63	24	87	73	0.9	3.5	4.4	60	15,600	75
S4	Pondtown Creek . . .	5,280	6	8.0	3.0	11	9	.2	1.0	1.2	16	1,400	7
S36	Mud Creek	13,110	16	17	5	22	18	.5	1.3	1.8	24	3,900	18
--	Precipitation and unmeasured inflow.	4,900	6	--	--	--	--	--	--	--	--	--	--
	Total	84,050	100	88	32	120	100	1.6	5.8	7.4	100	20,900	100
						Outflow							
S37	Price River	67,500	--	66	34	100	--	1.0	1.7	2.7	--	16,200	--

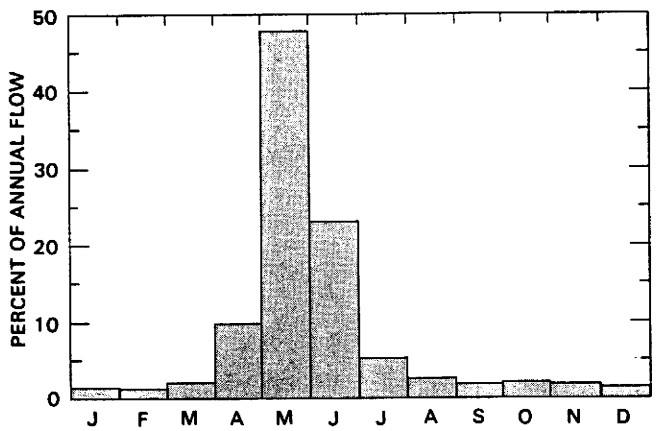

Figure 3. Monthly distribution of average annual flow at site S2 on Fish Creek, 1938–81.

The concentration of dissolved solids, which varies directly in response to the variation in concentrations of the predominant dissolved ions, calcium and bicarbonate, is largest during the late fall and winter when streamflow is low and is smallest during the snowmelt period in late spring and early summer when streamflow is high (fig. 4). The largest variation in the concentration of dissolved solids occurred in Mud and Pondtown Creeks; in Mud Creek the concentration ranged from about 190 to 390 milligrams per liter, and in Pondtown Creek the concentration ranged from 175 to 345 milligrams per liter. In Fish Creek, the concentration ranged from only about 180 to 240 milligrams per liter (fig. 4). The discharge-weighted average concentration of dissolved solids in the combined inflow of the streams from October 1, 1979, to August 31, 1980, was 195 milligrams per liter. The discharge-weighted average concentration represents the concentration that would occur if all the water were stored and mixed during the indicated period and there were no chemical changes or loss of water by evaporation. Fish Creek contributed about 75 percent of the dissolved-solids load, Mud Creek contributed 18 percent, and Pondtown Creek 7 percent (table 1).

The predominant ions in the outflow from Scofield Reservoir to Price River were calcium and bicarbonate (fig. 4). The concentration of dissolved solids in the outflow from the reservoir (site S37) was much less variable than that in the inflow; this is due to mixing in the reservoir. The minimum concentration of dissolved solids was about 160 milligrams per liter and occurred during the fall and the maximum concentration was about 185 milligrams per liter and occurred during the winter and spring (fig. 4). The discharge-weighted average concentration in the outflow from October 1, 1979, to August 31, 1980, was 175 milligrams per liter, which is about 20 milligrams per liter less than that of the inflow. The lesser concentration of dissolved solids in the outflow is due primarily to the loss of dissolved calcium and bicarbonate ions resulting from the chemical precipitation of calcium carbonate from water stored in the reservoir. (See section "Chemical and physical characteristics of water in the reservoir.")

Dissolved and Suspended Nitrogen and Phosphorus

Maximum or near maximum concentrations and most of the loads of dissolved and suspended phases of nitrogen and phosphorus in the water of inflowing streams occurred during snowmelt runoff, April–June 1980 (fig. 5).

Data in table 1 indicate that most of the load of total nitrogen (dissolved plus suspended) from October 1, 1979, to August 31, 1980, was contributed by Fish Creek. This occurred because the concentration of nitrogen in Fish Creek was about the same as that of the other streams, but the flow of Fish Creek was much greater than that of the other streams.

The estimated discharge-weighted average concentration of dissolved nitrogen (as N) from October 1, 1979, to August 31, 1980, was 0.8 milligram per liter for Fish Creek, 1.1 milligrams per liter for Pondtown Creek, and 1.0 milligram per liter for Mud Creek. The weighted average concentration of dissolved nitrogen in the combined inflow was 0.8 milligram per liter, and the average concentration of suspended nitrogen was 0.3 milligram per liter.

The concentration of total phosphorus in Mud and Pondtown Creeks is larger than that in Fish Creek. However, the load of total phosphorus contributed by Fish Creek is much greater than of Mud and Pondtown Creeks because of its greater flow (table 1).

The discharge-weighted average concentration of dissolved phosphorus was 0.01 milligram per liter for Fish Creek, 0.03 milligram per liter for Pondtown and Mud Creeks, and 0.01 milligram per liter in combined inflow. Suspended phosphorus is the largest portion of the load of total phosphorus in the inflowing streams. In the combined inflow, suspended phosphorus constitutes nearly 80 percent of the load of total phosphorus. The weighted average concentration of suspended phosphorus in the combined inflow was 0.05 milligram per liter, which is five times the weighted concentration of dissolved phosphorus.

Eccles Canyon, a tributary of Mud Creek, contributed relatively large concentrations of nitrogen and phosphorus to Mud Creek from October 1, 1979, to August 31, 1980. Most of the nitrogen and phosphorus load occurred during snowmelt runoff. For example, on May 22, 1980, the concentration of total nitrogen (suspended plus dissolved) was 21 milligrams per liter (fig. 5) and the concentration of total phosphorus was 4.3 milligrams per liter. Most of the nitrogen and phosphorus was in the

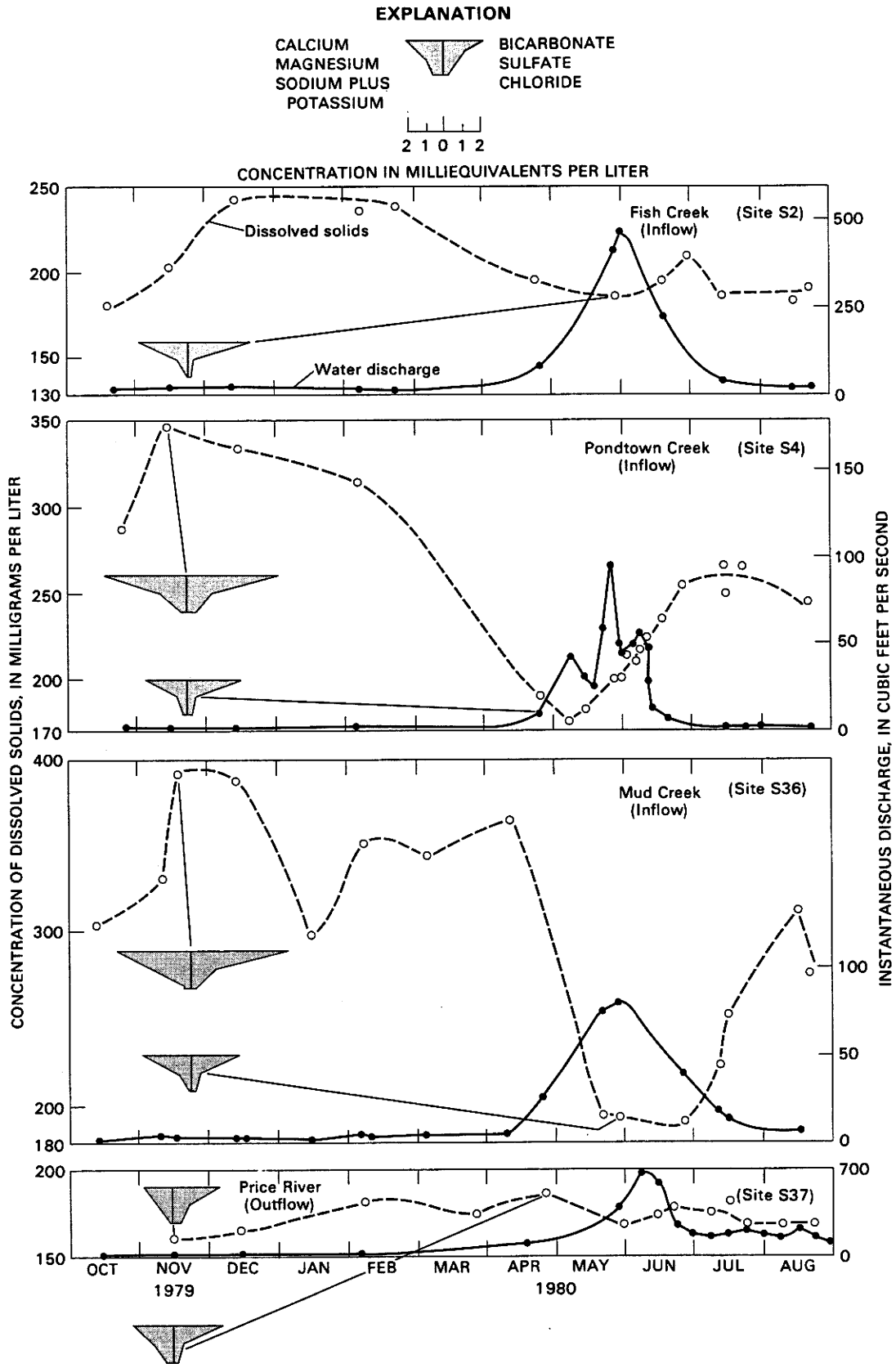

Figure 4. Variation of dissolved solids, water discharge, and chemical composition of stream inflow and reservoir outflow (Price River), October 1979–August 1980.

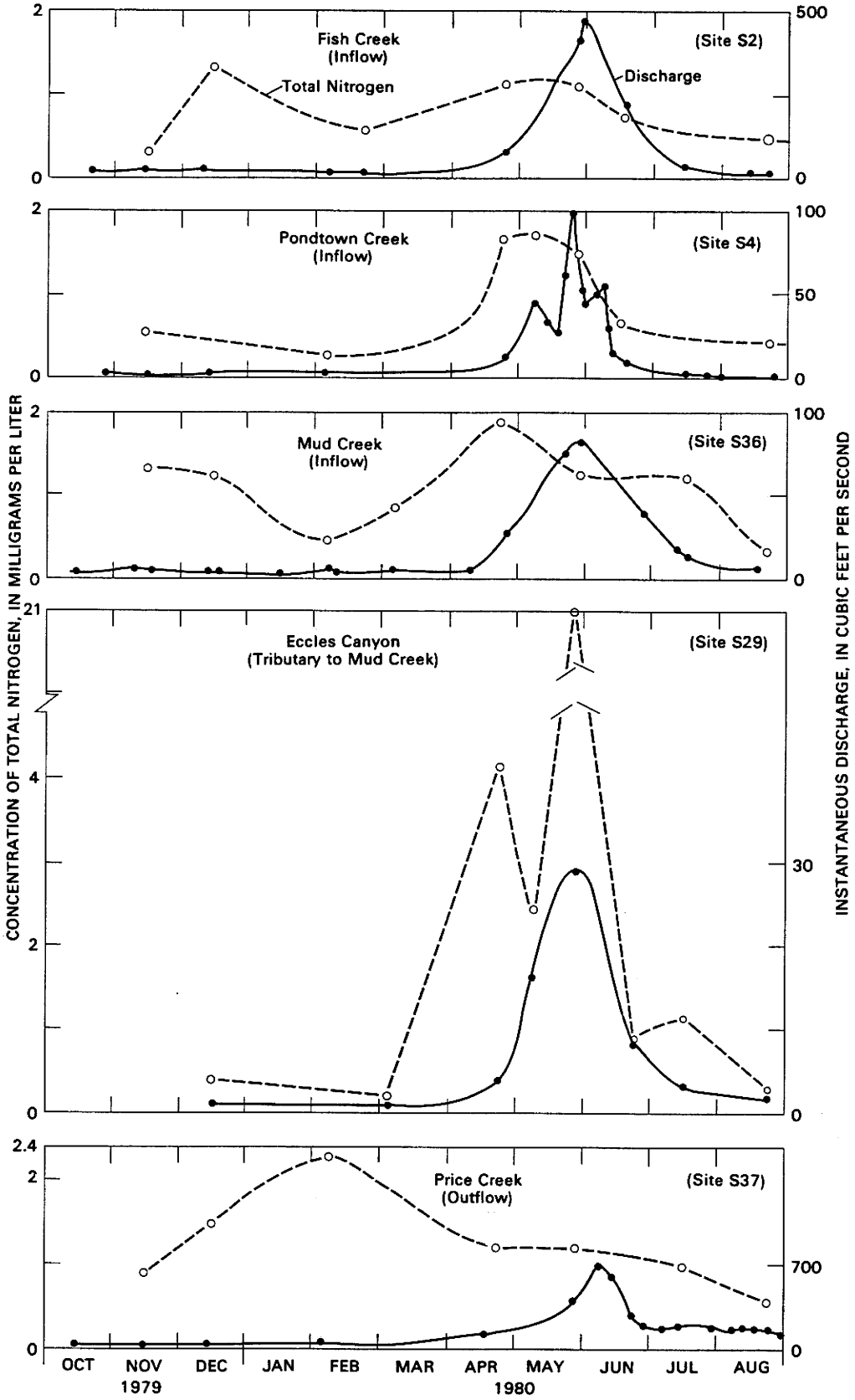

Figure 5. Variation of total nitrogen and water discharge in stream inflow and reservoir outflow (Price River) and in runoff from Eccles Canyon, November 1979–August 1980.

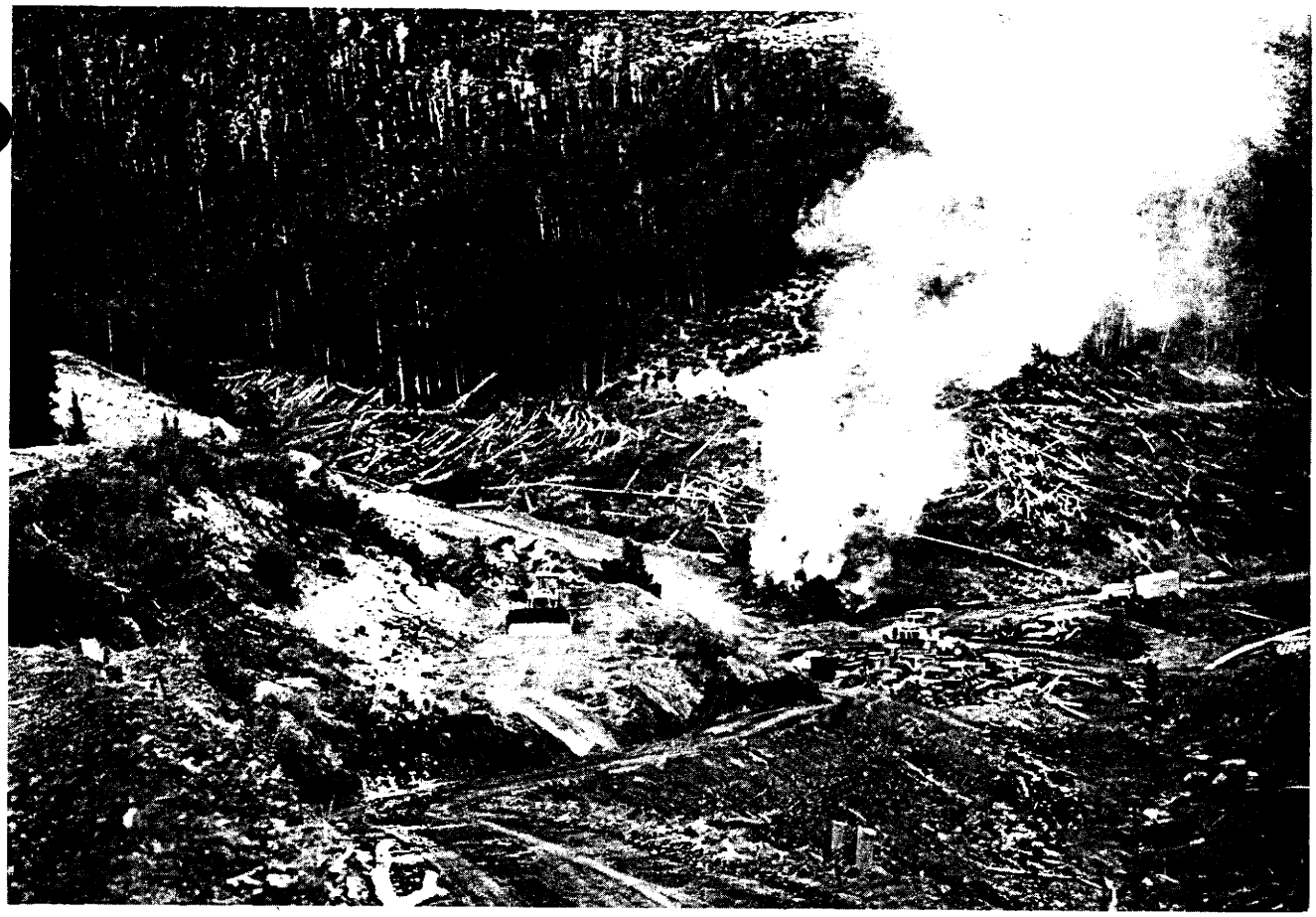

Figure 6. View of upper part of Eccles Canyon showing area being cleared for fire protection and road rights-of-way. (Photograph by Jeanette E. Dodge, 1979.)

suspended form. The unusually large concentrations of nitrogen and phosphorus probably resulted from flushing of residual debris that were left in the canyon during land clearing (fig. 6). According to Allen Owen, Coastal States Energy Co. (written commun., February 1981), about 27.3 acres of forested land were cleared in the canyon during 1979 for fire protection around new mine portals and for road rights-of-way.

Estimates of the dissolved and suspended quantities of nitrogen and phosphorus were compiled for site S29 near the mouth of Eccles Canyon, and are compared to similar data for site S36 in Mud Creek in table 2.

The data indicate that although Eccles Canyon contributed only about 20 percent of the water to Mud Creek, the suspended loads of nitrogen and phosphorus discharged form Eccles Canyon were seven times greater than at site S36 on Mud Creek. The discharge-weighted average concentrations of suspended nitrogen and phosphorus at site S29 in Eccles Canyon were 8.9 and 2.2 milligrams per liter, respectively, whereas at site S36 on Mud Creek the concentrations were only 0.3 and 0.07 milligram per liter. Thus, much of the suspended material (including nitrogen and phosphorus) must have settled or been filtered from the water in the reach of Mud Creek between the inflow of Eccles Canyon and site S36. This probably is due chiefly to numerous beaver dams as well as to slower stream velocities in the meandering downstream reach of Mud Creek.

At the outflow site for Scofield Reservoir (site S37 on the Price River), the maximum concentration of nitrogen occurred during February 1980 (fig. 5), and the maximum concentration of total phosphorus occurred during July 1980. From October 1, 1979, to August 31, 1980, the discharge-weighted average concentration of dissolved nitrogen was 0.6 milligram per liter; suspended nitrogen, 0.3 milligram per liter; dissolved phosphorus, 0.01 milligram per liter; and suspended phosphorus, 0.02 milligram per liter. Comparison of discharge-weighted average concentrations of total nitrogen and total phosphorus in the combined inflow with that of the outflow indicates that there is only a small change in concentration of nitrogen, but a significant decrease in the concentration of phosphorus in the outflow. Decreased suspended phosphorus accounted for most of the decrease of total

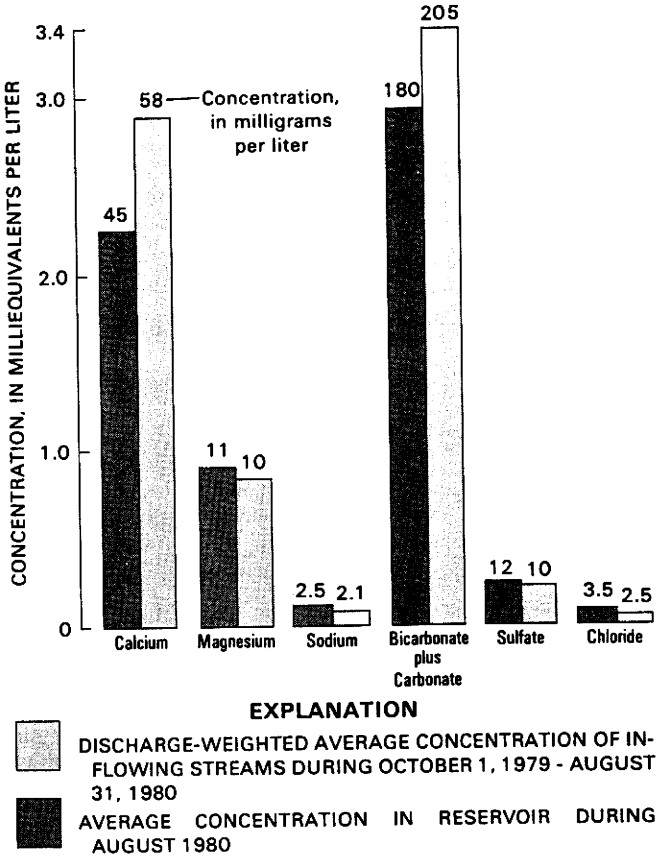

Figure 7. Comparison of chemical composition of major inflowing streams from October 1, 1979 to August 31, 1980, to average composition of Scofield Reservoir during August 1980.

A comparison of the weighted average chemical composition of the major inflowing streams from October 1, 1979, to August 31, 1980, and the average composition of the reservoir during August 1980 is shown in figure 7. Except for the smaller concentrations of calcium and bicarbonate in the reservoir, the chemical composition (based on major ions) of the inflow was very similar. The smaller concentrations of calcium and bicarbonate in the reservoir probably result from chemical precipitation of calcium carbonate.

The combined effect of chemical precipitation, leaching, inflow, and outflow on dissolved major ions in the reservoir from October, 1, 1979, to August 31, 1980, are given in table 4 by comparing theoretical loads of ions (in tons) with measured loads. The theoretical load represents the load in the reservoir exclusive of chemical changes. The most significant difference between the theoretical and measured dissolved-ion load from October, 1979, to August 31, 1980, was an apparent loss of 1,300 tons of calcium and 3,100 tons of bicarbonate (table 4, column 6). The tonnage of bicarbonate includes carbonates converted to an equivalent tonnage of bicarbonate.

Most of the loss of calcium and bicarbonate probably occurred by precipitation as calcium carbonate. Such precipitation in a reservoir is not unusual. Most of the streams entering Scofield Reservoir as well as water in the reservoir are saturated with respect to several carbonate minerals, including calcite and aragonite. In the reservoir, changes in the concentration of carbon dioxide (CO_2) affect the solubility of calcium carbonate.

The equilibria of calcium, bicarbonate, carbonate, and free carbon dioxide in water can be represented by the following equilibria equation:

$$\underset{\text{Calcium bicarbonate}}{Ca(HCO_3)_2} \rightleftharpoons \underset{\text{Calcium carbonate}}{CaCO_3 \downarrow} + \underset{\text{Water}}{H_2O} + \underset{\text{Carbon dioxide}}{CO_2}$$

If the concentration of CO_2 required to keep a given concentration of $CaCO_3$ in solution at equilibrium with $Ca(HCO_3)_2$ is decreased, $CaCO_3$ will precipitate (as indicated by the vertical arrow in the equilibria equation). If the concentration of free CO_2 is increased, additional

Table 4. Effect of chemical precipitation, inflow and outflow on loads (in tons) of dissolved ions in Scofield Reservoir, October 1, 1979–August 31, 1980

Dissolved ion	(1) Calculated reservoir load Sept. 1979	(2) Inflow load	(3) Outflow load	(4) Theoretical reservoir load Aug. 1980 (1+2−3)	(5) Calculated reservoir load Aug. 1980	(6) Increase (+) or decrease (−) in ion load (5−4)
Calcium (Ca)	2,400	6,300	4,200	4,500	3,200	−1,300
Magnesium (Mg)	820	1,100	1,100	820	820	0
Sodium (Na)	210	260	280	190	210	+20
Bicarbonate (HCO_3) plus Carbonate (CO_3)[1]	11,500	22,200	17,100	16,600	13,500	−3,100
Sulfate (SO_4)	890	1,200	1,300	790	970	+180
Chloride (Cl)	260	320	390	190	300	+110

[1]Carbonate (CO_3) has been converted to an equivalent quantity of bicarbonate (HCO_3) and added to the quantity of bicarbonate (HCO_3).

$CaCO_3$ will dissolve (Wetzel, 1975, p. 170). A major reason for loss of CO_2 in reservoirs is photosynthetic processes (which use CO_2) of algae and aquatic vegetation, primarily during the summer months. (See section "Plant photosynthesis and bacterial respiration.")

By converting the loss of calcium to the equivalent combining weight of bicarbonate, about 1,000 tons of calcium or 80 percent of the total loss can be accounted for by precipitation as $CaCO_3$. This leaves about 300 tons of calcium that cannot be accounted for as loss by chemical precipitation. However, some of the differences between the theoretical and measured dissolved loads are due to the errors associated with measurements of the inflow, outflow, and storage loads as well as use by the biota. The differences between the theoretical and measured dissolved-ion loads for the other constituents are less than 200 tons and are within measurement error.

The errors associated with computation of the budget of inflow and outflow of major ions were evaluated by comparison of independently computed dissolved-solids loads. The net load of dissolved solids was computed on the basis of dissolved solids for the inflow, outflow, and water in storage (table 5). The net decrease for October 1, 1979, to August 31, 1980, was 2,800 tons. A similar computation was made using the sum of the loads of major ions listed in table 4 (neglecting silica (SiO_2) and other constituents), and the net decrease from October 1, 1979, to August 31, 1980, was 2,500 tons. The agreement between the independently computed dissolved-solids loads seems reasonable considering that the difference is only 300 tons. It must be noted, however, that the discharges used in the computations of the loads also have measurement errors, and the same discharges were used to make both load computations.

Leaching of minerals from rocks and soils inundated by the reservoir is not believed to be appreciable for the following reasons:

1. There was a net loss of dissolved ions computed from October 1, 1979, to August 31, 1980 (table 4, column 6).
2. The predominant minerals in the rocks and soils inundated by the reservoir are limestones and dolomites. These minerals would not be conducive to leaching because of limited solubility and the fact that water entering the reservoir is already near or at saturation with respect to calcite and aragonite.
3. Most of the readily soluble minerals were dissolved and "flushed" from the area of inundation during the early years of inundation and it is not likely that significant quantities of those minerals would still be dissolving after 36 years of inundation.

Table 5. Water, dissolved solids, nitrogen, and phosphorus budget for Scofield Reservoir, October 1, 1979–August 31, 1980

Water (acre-feet)	
Storage	55,000
August 31, 1980	55,000
October 1, 1979	46,500
Change in storage	+8,500
Inflow to reservoir	
Streams	79,150
Precipitation	2,900
Total	82,050
Outflow from reservoir	
Price River	67,500
Evaporation	8,000
Total	75,500
Unmeasured inflow (rounded) = (Outflow + change in storage) − inflow	2,000
Dissolved solids (tons)	
Storage load, October 1, 1979	10,500
Inflow load	20,900
Storage load, August 31, 1980	12,400
Outflow load	16,200
Net load change	−2,800
Total nitrogen (tons)	
Storage load, October 1, 1979	80
Inflow load	120
Storage load, August 31, 1980	68
Outflow load	100
Net load change	−32
Total phosphorus (tons)	
Storage load, October, 1979	2.2
Inflow load	7.4
Storage load, August 31, 1980	3.2
Outflow load	2.7
Net load change	−3.7

Plant Photosynthesis and Bacterial Respiration

The balance between plant photosynthesis and bacterial respiration probably is the most important factor controlling the chemistry of productive lakes and reservoirs. The following equation expresses the equilibrium between the reactants and products involved with photosynthesis and respiration (Stumm and Baccini, 1978, p. 98):

$$106CO_2 + 16NO_3^- + HPO_4^{-2} + 122H_2O + 18H + 18H^+ + \text{(trace elements, energy)} \underset{\text{Respiration}}{\overset{\text{Photosynthesis}}{\rightleftharpoons}} \underset{\text{(Algal protoplasma)}}{C_{106}H_{263}O_{110}N_{16}P} + 138O_2 \quad (1)$$

The equilibria of the equation may be shifted in either direction depending upon the availability of the reactants and products, and the energy (light). If conditions are suitable for producing algae, such as in the shallow, trophogenic zone of a lake or a reservoir during the summer, the equation may be shifted to the right. In this

situation, dissolved oxygen (O_2) is produced together with the algae. The algae protoplasma contains nitrogen, phosphorus, and carbon (and other nutrients not included in equation 1). The water may become supersaturated by the dissolved oxygen produced in the reaction, and the environment becomes very oxidizing. Also, carbon dioxide (CO_2) is depleted and pH increases (use of hydrogen ions). In the oxidizing environment, dissolved inorganic nitrogen will occur primarily in the form of nitrate (NO_3). As the algae die or descend into the deeper zones where there is less light or energy available for photosynthesis, bacterial decomposition and respiration become the dominant processes. In this situation, there is a shift of the equilibria of equation 1 to the left, causing a depletion of dissolved oxygen but increasing the concentration of carbon dioxide, nitrogen, and phosphorus. The increased concentration of CO_2 causes a decrease of the pH. The environment may become reducing, and if so, inorganic nitrogen will occur primarily in the form of ammonia (NH_4).

Limnologic Cycle

The limnologic cycle is a series of related events within the regime of a lake or reservoir that occur during the year that describe (1) the circulation patterns or lack of circulation (stratification) patterns in lakes and reservoirs, and (2) the thermal and chemical processes that are associated with circulation or lack of circulation in the reservoir (Bolke and Waddell, 1975).

Circulation of Water

The circulation pattern of Scofield Reservoir is typical of a high altitude, temporal region lake. The changes in seasonal circulation are the result of variations in solar radiation and ambient air temperatures. In the reservoir, the water will stratify as differences in density associated with temperature changes occur. At a certain time during the spring the lake becomes homothermous at 3.9° Celsius, the maximum density of water. Winds easily generate currents that circulate the water, mixing the oxygen from the surface, the nutrients from the bottom, and the suspended plankton. This is known as spring turnover and lasts only a few days. When the temperature of water becomes greater than 4° Celsius the density of the water decreases.

The thermal gradient established in lakes or reservoirs is sometimes destroyed by wind action, especially in shallow reservoirs such as Scofield Reservoir where a nearly uniform temperature prevails throughout the water body. In the autumn, a cooling of the uppermost water causes it to become more dense than the water immediately below. the denser water displaces the water below and that too is then cooled, creating convection currents, which eventually mix the reservoir until it again reaches a uniform temperature. This is the autumn turnover, which lasts somewhat longer than the spring turnover. The reservoir becomes inversely stratified during the winter months when a layer of ice forms on the surface. Near-freezing water (near 0° Celsius) close to the ice layer overlies the warmer (near 3.9° Celsius) but more dense water. The limnologic cycle is complete when the ice melts and the upper layers again become warmed. (See Wetzel, 1975, p. 66–75.)

Thermal and Chemical Stratification

Data collected by the Utah State Department of Health during 1980–81, and by the U.S. Geological Survey during 1980, were used to show seasonal trends of temperature, dissolved oxygen, and dissolved solids near the outlet of Scofield reservoir (fig. 2, site M5), which is the deepest part of the reservoir. Although the data were not collected continuously at site M5 for a given year, they were sufficient for illustrating seasonal changes as affected by circulation and stratification.

Variations of dissolved oxygen, temperature, and dissolved solids with depth are shown in figure 8. Profiles *A, C,* and *E* show the variations prior to and following the spring turnover of 1981; profiles *B, D,* and *F* show them prior to and following the autumn turnover of 1980. Using the same data shown in figure 8, depth-time trends of temperature and dissolved oxygen were prepared (fig. 9) to further illustrate the seasonal variation and emphasize the turnover periods.

The graphs of temperature for January, February, and April 1981, are almost identical (fig. 8*C*). Surface temperatures immediately below the ice cover ranged from 1.5° to 2.5° Celsius (±0.5° Celsius), and deeper in the reservoir (below an altitude of about 7,600 feet) temperatures ranged from about 3.5° to 4.5° Celsius. The maximum density of water occurs at 3.9° Celsius, which is within the range of temperatures measured in the water below an altitude of about 7,600 feet. In this situation, where colder water is overlying warmer water, thermally the reservoir is considered to be inversely stratified. This type of stratification is weak because the difference in density between the warmer and colder water is very small. Because of the weak stratification, winds can easily create turbulence and mixing. However, during the ice-covered period, the water is conducive to stratification because the ice cover protects the water from wind, thereby preventing turbulence and mixing.

The graphs for dissolved oxygen and dissolved solids show that the reservoir was chemically stratified during January–April (fig. 8*A, E*). The concentration of dissolved oxygen at the surface (altitude 7,612 feet) ranged from 6 to 7.5 milligrams per liter and was less than 1.0

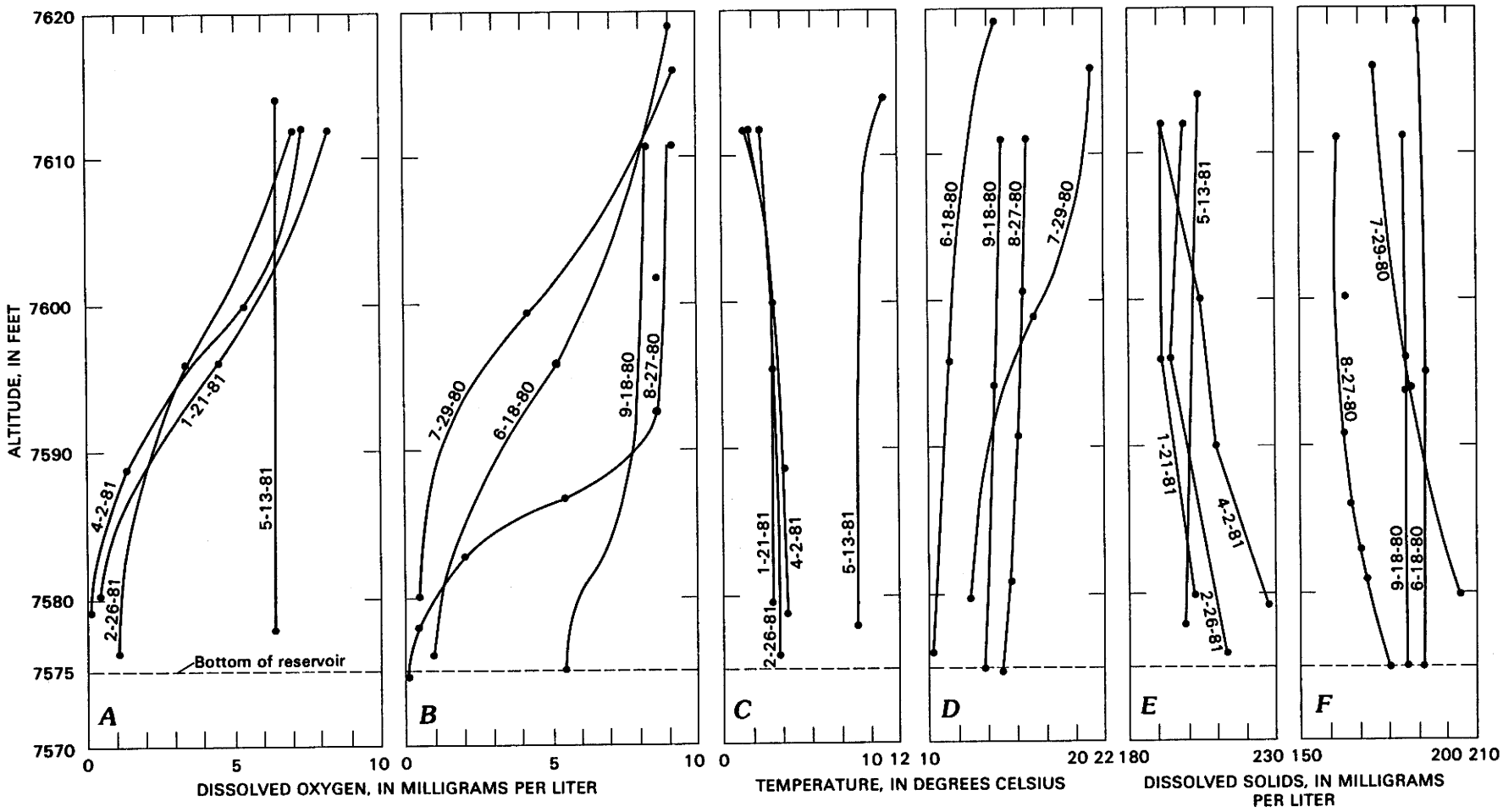

Figure 8. Vertical profiles of concentration of dissolved oxygen, water temperature, and concentration of dissolved solids at site M5, near dam, 1980–81.

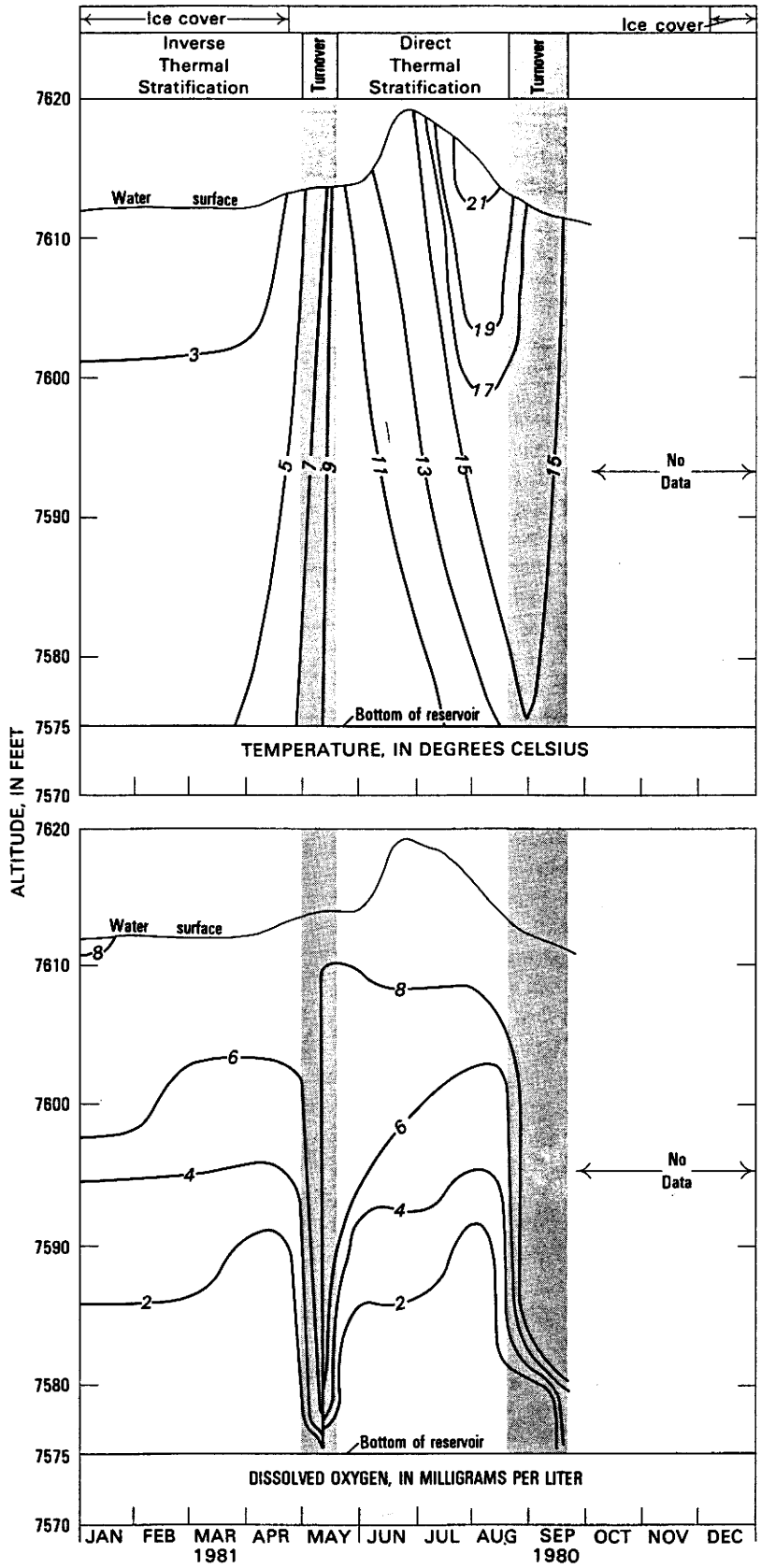

Figure 9. Depth-time diagram of dissolved oxygen and temperature, showing periods of ice cover, thermal stratification, and turnover at site M5, January–May 1981 and June–September 1980.

milligram per liter near the bottom (below an altitude of 7,580 feet). The vertical profiles of dissolved-solids concentrations also suggest little or no mixing, as the gradients of the profiles progressively increase from January to April. During January, the concentration of dissolved solids ranged from about 190 milligrams per liter at the surface to 200 milligrams per liter near the bottom, whereas in April the concentration ranged from about 190 milligrams per liter at the surface to nearly 230 milligrams per liter near the bottom. The concentration of dissolved solids in the reservoir at any time of the year is largely a mixture of base flows and high flows that have occurred during the prior months. Thus, during periods of base flow (such as January–March) the inflow contains larger concentrations of dissolved solids than the reservoir. Therefore, without mixing of waters in the reservoir, conditions are conducive to the development of differences of concentrations of constituents in the reservoir.

During April 2–May 13, 1981, the ice cover on Scofield Reservoir melted and the water temperatures increased from surface to bottom. On May 13, the temperature was 11° Celsius at the surface and 9.5° Celsius at the bottom (fig. 8*C*). The surface water was now warmer than the underlying water as opposed to April when the surface layer was colder than the underlying water. Thus at some time between April 2 and May 13, the temperature became uniform from surface to bottom, and in the absence of the ice cover, the water became susceptible to mixing and spring turnover occurred (fig. 9).

On May 13, 1981, the absence of the anaerobic zone and vertical homogeneity of dissolved oxygen and dissolved solids also indicated that the reservoir had mixed. The concentration of dissolved oxygen was about 6.5 milligrams per liter from the surface to the bottom and the concentrations of dissolved solids ranged from 205 milligrams per liter at the surface to 200 milligrams per liter near the bottom.

The changes in the thermal and chemical characteristics also denote the late summer and autumn turnover. The temperature profile during June 1980, was similar to that of May 1981, but the water was warmer, with temperatures ranging from about 15° Celsius at the surface to 10° Celsius at the bottom (fig. 8*D*). On July 29, 1980, the maximum measured water temperatures and thermal gradient occurred, with temperatures ranging from 21° Celsius at the surface to 13° Celsius at the bottom. Also on July 29, the maximum depletion of dissolved oxygen occured (fig. 8*B*) and the concentration of dissolved solids reached its maximum gradient (fig. 8*F*) since prior to the spring turnover.

On August 27, the first indication of mixing occurred since the spring turnover. The temperature gradient had almost disappeared, as temperatures ranged from 17° Celsius at the surface to 15° Celsius at the bottom (fig. 8*D*). Dissolved oxygen had now been replenished in a zone where it was previously depleted. For example, on July 29, the dissolved-oxygen concentration was near 0 milligram per liter in the bottom 15 feet, whereas on August 27, the dissolved-oxygen concentration was almost 0 milligram per liter in the bottom 5 feet. Likewise, the concentration of dissolved solids showed the effects of mixing, as the concentrations were homogeneous to a greater depth on August 27 than on July 29 (fig. 8*F*).

Comparison of dissolved-oxygen and dissolved-solids profiles on August 27 and September 18 (fig. 8*F*) indicate that additional mixing occurred within this period. On September 18, oxygen was no longer greatly depleted at the bottom of the reservoir, as the concentration ranged from 5.5 milligrams per liter near the bottom to about 8 milligrams per liter at the surface. Also, the concentration of dissolved solids was nearly the same—about 185 milligrams per liter from surface to bottom (fig. 8*F*). The gradient of water temperatures did not change from August 27 to September 18, but the temperature cooled about 2 degrees Celsius from the surface to the bottom during that period.

Scofield Reservoir, although being dimictic with turnovers in the spring and autumn, did not develop a well-defined epilimnion and hypolimnion during 1980. Thermal stratification in Scofield Reservoir is undoubtedly affected by the inflow-outflow relationship—a large inflow of water relative to the volume of water in storage can alter the thermal gradient. Also, in shallow reservoirs such as Scofield Reservoir, especially if not protected from the wind, depth may not be sufficient to maintain a typical epilimnion and hypolimnion. During the summer stratification period of 1980, there was only about one month when an epilimnion could be distinguished.

Dissolved Oxygen

Dissolved oxygen in water is fundamental for the propagation of aquatic life. It is derived chiefly from air in contact with water, but is also a byproduct of photosynthesis by aquatic vegetation. Dissolved oxygen may be depleted from the water by respiration of vegetation and other aquatic life, including micro-organisms that decompose organic matter in water. (See section "Plant photosynthesis and bacterial respiration.") The solubility of dissolved oxygen is directly proportional to atmospheric pressure and inversely proportional to water temperature.

Data collected by the U.S. Geological Survey during September and October 1979 and August 1980 were used to describe the variation of dissolved oxygen with depth throughout the reservoir. During September and October 1979, the concentration of dissolved oxygen ranged from less than 8 to about 10 milligrams per liter (fig. 10), and the homogeneity of dissolved oxygen throughout the reservoir was a result of mixing during the autumn turnover. During August 1980, the concentration of dissolved oxygen was about 8 milligrams per liter in the upper few feet of the reservoir but decreased with depth and became almost depleted just above the water-sediment interface.

lower layers was at a maximum, and thermal and chemical stratification was more developed than during the other sampling periods (figs. 8 and 11).

Dissolved Trace Metals and Other Minor Elements

During the September–October 1979 and August 1980 sampling periods, the concentration of dissolved arsenic, chromium, lead, and selenium did not exceed the maximum contaminant levels set by the U.S. Environmental Protection Agency, Environmental Studies Board (1976, p. 5) for public water systems. Reducing conditions in the anaerobic zone, however, were conducive to increased concentrations of iron and manganese. During August 1980, in the anaerobic zone at site M5, the concentration of iron was 60 micrograms per liter and that of manganese was 750 micrograms per liter. At other sampled sites and depths, however, the concentration of dissolved iron was less than about 30 micrograms per liter, and dissolved manganese was less than about 100 micrograms per liter.

Dissolved and Suspended Nitrogen and Phosphorus

Dissolved and suspended forms of nitrogen and phosphorus were determined for 23 samples collected from the reservoir during September and October 1979, and August 1980. Dissolved and suspended forms of nitrogen were separated into the inorganic and organic phases. The inorganic phases included nitrite, nitrate, and ammonia. Only the dissolved phase of phosphorus was determined separately from total phosphorus, which includes both dissolved and suspended or particulate matter.

Most of the dissolved nitrogen was in the organic form. The concentration of dissolved organic nitrogen ranged from 0.38 to 0.81 milligram per liter and averaged 0.55 milligram per liter during 1979 and 1980 (table 6). The maximum concentration occurred in 1979 at the 1-foot depth zone at site M5. The maximum concentration of dissolved inorganic nitrogen during September–October 1979 was 0.12 milligram per liter, and during August 1980 the maximum was 0.47 milligram per liter. Most of the dissolved inorganic nitrogen was in the form of ammonia (NH_4^+) and occurred in the deeper part of the reservoir where anaerobic conditions existed.

Suspended inorganic nitrogen ranged from 0.12 to 1.44 milligrams per liter during September and October 1979 but was less than 0.01 milligram per liter during August 1980. Most of the suspended inorganic nitrogen was in the form of ammonia, and the largest concentration was at a depth of 1 foot at size M20. Suspended organic nitrogen varied from less than 0.01 to 3.62 milligrams per liter and the largest concentration was at a depth of 1 foot at site M65, which is near the inflow of Mud Creek. The concentrations of total nitrogen, which includes both dissolved and suspended forms of organic and inorganic nitrogen, ranged from 0.53 to 4.00 milligrams per liter and averaged 1.26 and 0.91 milligrams per liter during 1979 and 1980, respectively.

Dissolved phosphorus, which includes the organic

Table 6. Statistical summary of dissolved and suspended forms of nitrogen and of dissolved and total phosphorus for Scofield Reservoir, September–October 1979 and August 1980

Date		Milligrams per liter						
		Nitrogen (as N)					Phosphorus (as P)	
		Dissolved		Suspended		Total	Dissolved	Total
		Inorganic	Organic	Inorganic	Organic			
September–October 1979	Minimum	0.01	0.42	0.12	<0.01	0.86	0.00	0.01
	Maximum	.12	.81	1.44	1.37	2.10	.01	.06
	Average[1]	--	.55	--	--	1.26	.01	.03
August 1980	Minimum	0.05	0.38	<0.01	0.01	0.53	0.00	0.03
	Maximum	.47	.63	<.01	3.62	4.00	.12	.18
	Average[1]	--	.55	--	--	.91	--	.04

[1]Average concentration for the reservoir was determined by drawing lines of equal concentration for a cross section of the reservoir and then weighting by the respective increments of volume.

and inorganic phases, ranged from 0.00 to 0.12 and averaged 0.01 milligram per liter during 1979. An average was not determined for 1980 because of the large range for such a relatively small number of samples. Total phosphorus, which includes both the dissolved and suspended forms of organic and inorganic phosphorus, ranged from 0.01 to 0.18 and averaged 0.03 and 0.04 milligram per liter during 1979 and 1980, respectively (table 5).

Because of the large ratio of inflow and outflow to storage, the quality of water discharging from the reservoir reflects, to a large extent, the seasonal changes that are occurring in the upper layers of the reservoir. For this reason, total nitrogen was separated into the dissolved and suspended forms of organic and inorganic nitrogen so that changes of nitrogen that are related to changes in photosynthesis in the reservoir could be distinguished (fig. 12). Dissolved nitrogen (inorganic plus organic) is greatest during the winter months when productivity, and thus the demand for nitrogen, is least. The concentration of dissolved nitrogen then decreases rapidly during the summer months as the growth of algae (and aquatic vegetation) is consuming large quantities of dissolved nitrogen. The suspended or particulate nitrogen is virtually nil during the fall, winter and spring when algae production is negligible, but increases and reaches a peak during the summer when algae production is large—indicating that most of the suspended organic nitrogen probably is contributed by the algae.

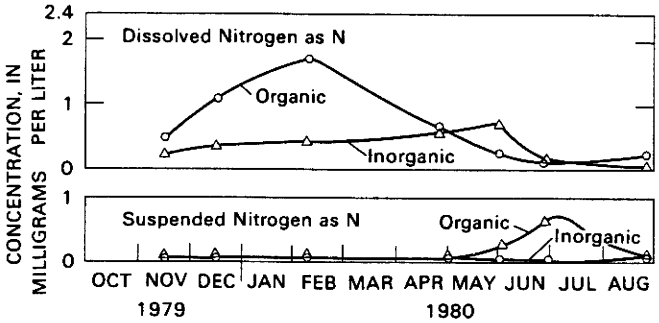

Figure 12. Variation of dissolved and suspended forms of nitrogen in reservoir outflow (Price River), November 1, 1979–August 31, 1980.

Trophic State

Waters that are enriched in nutrients are very susceptible to excessive production of algae and aquatic vegetation. A rapid rate of productivity affects the overall metabolism in the water, which causes deterioration of the water quality. As a means of classifying the state of productivity of lakes, the concepts of oligotrophy and eutrophy were introduced by limnologists during the early part of this century. Oligotrophic lakes contain small amounts of planktonic algae and eutrophic lakes contain large amounts of plantonic algae. Recent investigators, such as Vollenweider (1971) and Wetzel (1975), have related the productivity of lakes to the nutrient quantity in the water.

The most important nutrients in determining the productivity of lakes generally are regarded to be nitrogen and phosphorus. Vallentyne (1974) showed that the typical tissue of algae and aquatic vegetation contains phosphorus, nitrogen, and carbon in approximately the ratios 1P:7N:40C per 500 grams of net wet weight. Typically, phosphorus is regarded as the limiting nutrient in most lakes and reservoirs. Therefore, if nitrogen and carbon are present in quantities near the above ratios (along with certain trace elements), 1 gram of phosphorus can potentially generate 500 grams of algal biomass. Wetzel (1975, p. 640) states: "Oligotrophic lakes often are limited by phosphorus and contain an excess of nitrogen. As the lakes become more productive, the primary effecting agent is increased loading of phosphorus."

Attempts by many investigators to relate the various fractions of phosphorus to metabolism of phosphorus have been unsuccessful. Wetzel (1975, p. 216) states: "The most important quantity, in view of the metabolic characteristics within a lake, is the total phosphorus content of unfiltered water, which consists of the phosphorus in suspension in particulate matter, and the phosphorus in 'dissolved' form***."

The different forms of nitrogen cannot be used to the same extent by the different groups of plants. Vollenweider (1971, p. 27) presented a table that shows the forms of nitrogen used by different groups of plants (table 7). The significant aspect of these data is that all groups of plants use organic nitrogen, including blue-green algae, which is the most objectionable form of algae. (It should be noted that there is some controversy among biologists whether blue-green blooms are actually algae.) Bacterial decomposition is required before many plants can use organic nitrogen; however, in a reservoir or lake there is usually an excess of active bacteria to cause decomposition.

The trophic state of Scofield Reservoir was evaluated on the basis of the nutrient content of the inflow, of water in storage, and of the outflow, and on the basis of dissolved-oxygen depletion during the summer stratification

Table 7. Uses of different forms of nitrogen (from Vollenweider, 1971)

	Organic N	$N(NH_3)$	$N(NO_3)$	N_2
Some bacteria and eumycetes, some species of Euglena	x			
Some bacteria and Eumycetes	x	x		
Most bacteria, Eumycetes, algae and higher plants	x	x	x	
Some bacteria and blue-green algae	x	x	x	x

period. Most of the evidence indicates that the trophic state is intermediate between mesotrophic and eutrophic and that the reservoir may become eutrophic unless corrective measures are taken to limit nutrient inflow.

The general degree of lake productivity as related to the concentrations of nitrogen and phosphorus is shown in table 8. The average concentration of dissolved organic nitrogen in the reservoir was 0.55 milligram per liter during 1979 and 1980, and according to table 8 the lake would be classified as mesotrophic. The average concentration of total phosphorus was 0.03 and 0.04 milligram per liter during 1979 and 1980, respectively, and would classify the reservoir as eutrophic. The average concentration of dissolved inorganic nitrogen was not computed because of the large variability for such a small number of samples. However, the weighted average concentration of dissolved inorganic nitrogen in the outflow from the reservoir from October 1, 1979, to August 31, 1980, was 0.4 milligram per liter, and provides a suitable estimate of the average concentration in the reservoir. Therefore, for an average concentration of 0.4 milligram per liter, table 8 indicates that from October 1, 1979, to August 31, 1980, the lake would have been classified as mesotrophic.

The concentration and forms of nitrogen and phosphorus change seasonally in Scofield Reservoir due to inflow, outflow, change in equilibria between photosynthesis and respiration, denitrification, and sedimentation, as well as other factors. Thus, the average concentrations that were computed during September–October 1979 and August 1980 and the classification of trophic state may not represent average conditions existing through the productive period.

Vollenweider (1971) presented another method to evaluate the trophic state of a reservoir, which is based on the inflow load of nutrients and the mean depth of the reservoir. This classification, based on total phosphorus, is shown in figure 13. According to figure 13, Scofield Reservoir would be considered borderline between mesotrophic and eutrophic. Vollenweider (1971, fig. 18) also prepared an illustration similar to figure 13 that was based on total nitrogen. When the concentration of total nitrogen in the infow to Scofield Reservoir was computed and compared with this illustration, the plot indicated that Scofield Reservoir was borderline between mesotrophic and eutrophic.

Table 8. General relationship of lake productivity to average concentrations of epilimnetic nitrogen and phosphorus (modified from Vollenweider, 1971)

General degree of lake productivity	Approximate average (milligrams per liter)		
	Inorganic nitrogen	Organic nitrogen	Total phosphorus
Ultra-oligotrophic	<0.20	<0.20	<0.005
Oligo-mesotrophic	.20–.40	.20–.40	.005–.010
Mesotrophic	.30–.65	.40–.70	.010–.030
Eutrophic	.50–1.5	.70–1.2	.030–.100
Hypereutrophic	>1.5	>1.2	>.100

Probably the most important aspect or consideration, regardless of the productivity classification based on the nutrients, is the undesirable effects of excessive plant production on critical water-quality constituents such as dissolved oxygen. Depletion of dissolved oxygen occurs in very productive lakes and can directly affect living organisms, especially fish and benthic invertebrates.

During the summer of 1980, dissolved-oxygen depletion occurred within a few weeks of "spring turnover," and anaerobic conditions existed throughout the summer stratification period. (See section "Dissolved oxygen.") Rapid depletion of oxygen and development of anaerobic conditions is common to very productive lakes and reservoirs. The extent of damage to the fishery caused by the current rate of depletion is not known; however, if the depleted zones continue to expand, the effect on living organisms would be considerable. Seasonal monitoring of dissolved oxygen and nutrients at site M5 needs to be continued in order to determine if the depletion of dissolved oxygen is increasing. Also nutrients and plant productivity needs to be monitored in the reservoir inflow and outflow in order to detect the possibility of increasing productivity and eutrophication.

CHEMICAL AND PHYSICAL CHARACTERISTICS OF SEDIMENTS IN THE RESERVOIR

The interactions between the sediments and overyling water significantly affect the chemical and physical characteristics of lakes and reservoirs, and the processes governing those interactions are complex. During 1979–80, efforts were made to provide some information pertaining to the sediments that would aid planning of more detailed investigations. The quantity and rate of sediment deposition were studied by comparison of bathymetric profiles and by determination of age of sediment cores using radiochemical-dating techniques (lead-210). The quantity of coal and trace metals in the sediments and the particle size of the sediments were determined at selected sites.

Deposition of Sediment

A bathymetric survey was conducted and cores of bottom sediment were collected from Scofield Reservoir during 1979–80. The purposes of the survey were to provide a basis for estimating the total sediment yield from inflowing streams subsequent to an earlier survey by the U.S. Bureau of Reclamation (1943), and to provide

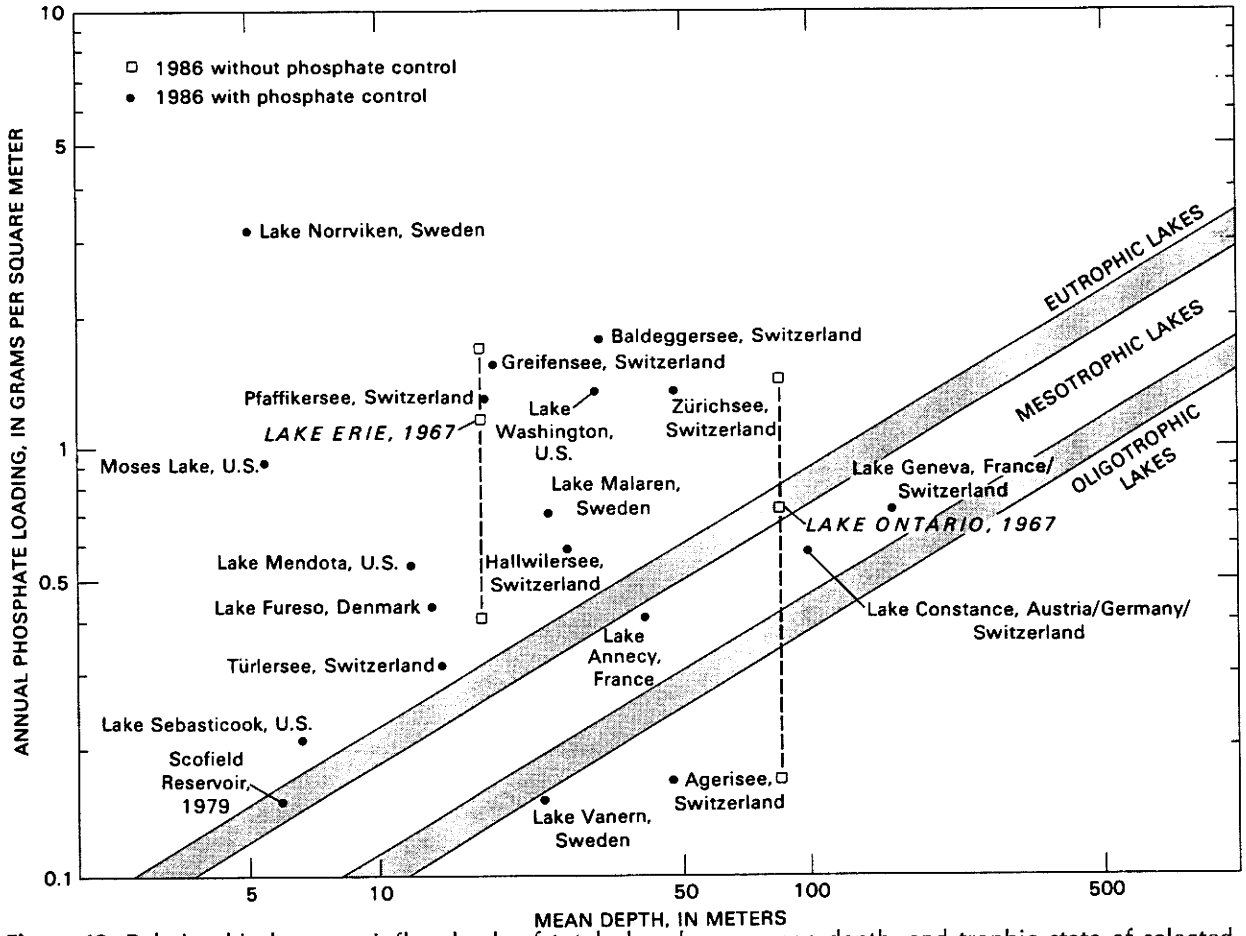

Figure 13. Relationship between inflow loads of total phosphorus, mean depth, and trophic state of selected reservoirs and lakes. (Modified from Stumm and Baccini, 1978, fig. 15; published with permission.)

more detailed bathymetric measurements at selected cross sections so that future deposition could be evaluated more accurately. The cores were sliced into sections, and the age of the sediment was determined by use of the radioisotope lead-210. The age of each section was determined so that estimates of the rate of sediment deposition could be computed.

Bathymetric Survey

Bathymetric soundings were made for four reservoir cross sections during September 1979 (fig. 14). These cross sections were located using surveyed points around the shore of the reservoir. Reference posts were established at these surveyed points on the shore of the lake. Then, by using a range finder located on the shore of the lake and through radio communication with the boat operator, one to three intermediate buoys were located within each cross section.

A recording fathometer, mounted in the boat, was then used to record depths across each section. The boat traversed across each section at a constant speed from a point near the shoreline, and notes were made on the recorder when an intermediate reference point was passed. The fathometer recordings were then superimposed on a map of the reservoir and 1-foot contour intervals were drawn for altitudes up to 7,612 feet, which was the average altitude of the water surface during the period the bathymetric surveys were made. From this map, altitude-volume relationships were developed (fig. 15).

The total volume of sediment that was deposited in Scofield Reservoir from 1943 to 1979 was computed by comparing the 1979 and 1943 bathymetric surveys, and was found to be 3,000 acre-feet (wet volume). Using the ratio of 60 pounds of dry sediment per cubic foot of wet sediment (as determined from laboratory analyses of core samples), the dry weight of sediment was determined to be 3.9 million tons. For the approximately 113 square miles of drainage area upstream from the reservoir, this is equivalent to an average sediment yield of about 960 tons per square mile per year, or about 0.5 acre-foot per square mile per year. Since 1943, sediment deposition has decreased the original storage capacity of the reservoir about 4 percent.

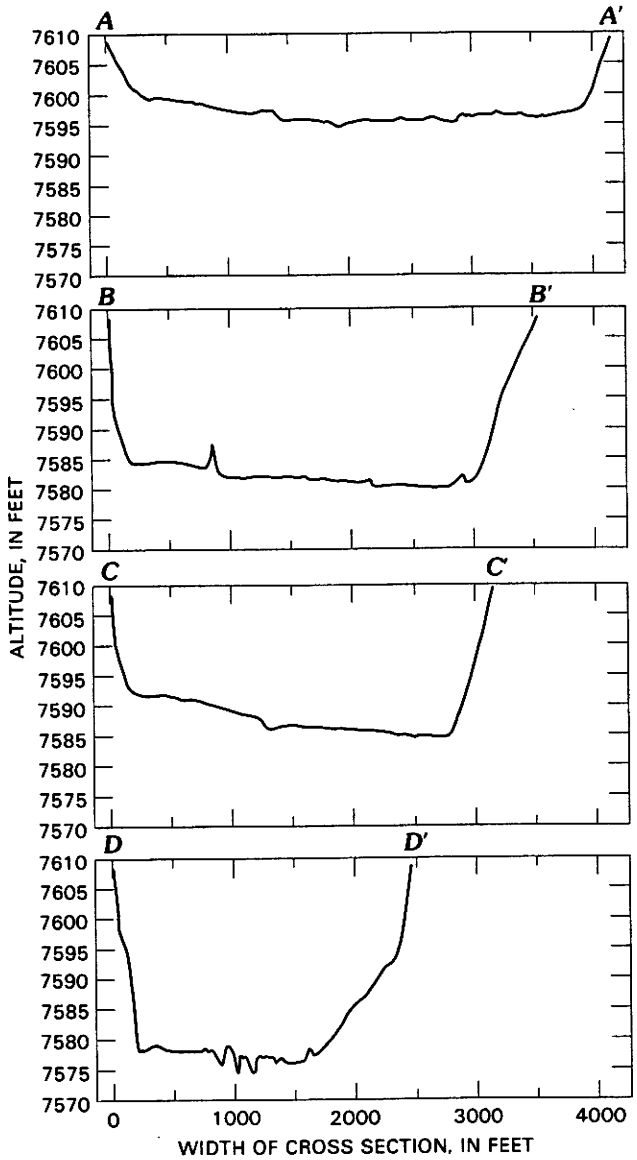

Figure 14. Bathymetric profiles, 1979. (See fig. 2 for location.)

Radiochemical Dating

An estimate of the rate of sediment accumulation also was made by determining the age of sediments for cores collected at sites M30 and M65. The core-sampling device used is shown in figure 16. The age of the sediments was determined by use of the radioisotope lead-210.

The radiochemical analyses were performed using procedures described by I.C. Yang (U.S. Geological Survey, written commun., April 8, 1981).

Lead-210 by gamma scan. Ninety grams of the core sample were placed in a plastic counting vial and the gamma radiation was counted for 2 days in a lead-shielded (lithium) gamma spectrometer. The lead-210 region of interest at 46,500 electron volts was integrated and the background was subtracted. The counting efficiency was determined by spiking a calibrated solution into 90 grams of the same background sediment (deeper sediment) and counting with the same geometry. The results for lead-210 in the samples were reported in picocuries per gram (dry weight).

Lead-210 by chemical separation. For this method, samples were analyzed in duplicate. Standards and blanks were processed concurrently, to obtain accurate recovery. Five-gram portions of each core sample were heated in a muffle furnace at 400° Celsius for 3 hours to remove volatile organic compounds. The samples were placed in teflon beakers for digestion, using two digestion methods. One method uses a mixture of hydrochloric, nitric, and hydrofluoric acids in a ratio of 1:1:4 (by volume). The other method uses a mixture of hydrochloric acid, nitric acid, and hydrogen peroxide in a ratio of 1:1:4 (by volume). These digestion methods were used alternately until satisfactory dissolution was obtained. The residue was completely dried after each digestion.

After dissolution, a mixture (1:1 ratio) of hydrochloric and sulfuric acids was added, reduced to 50 milliliters, and then 10 milliliters of concentrated sulfuric acid was added to convert the salts to sulfate and remove nitrate and chloride. This solution was evaporated to a white fuming residue and then dissolved in 700 milliliters of de-ionized water. The sample was then analyzed for lead-210 as a water sample by a standard U.S. Geological Survey method.

Radium-226. The radium-226 concentration in the cores was determined separately using 1-gram samples. After total dissolution (as with lead-210) the solution was analyzed by the radon de-emanation method. To obtain the nonsupported lead-210 values, the radium-226 concentrations in picocuries per gram were subtracted from the lead-210 total values.

Lead-210, which has a half-life of about 21.4 years, is an unstable radioactive form of lead found in the sediment, and decays to the more stable form, lead-206. The older, deeper sediments have a lower lead-210 activity than the surface sediments. By plotting the activity of lead-210 for different depths of sediment, a curve was drawn to determine the age of the sediments (fig. 17). The rate of accumulation for the two (wet) cores ranged from 0.18 to 0.60 centimeter per year and averaged about 0.31 centimeter per year.

The standard error of the mean of the six measurements was 0.02 centimeter per year; and for a 90-percent probability level, the confidence interval of the sample mean is 0.31±0.04 centimeter per year. Therefore, for the average rate of accumulation, there is a 90-percent probability that the average for the two samples is somewhere between 0.27 and 0.35 centimeter per year. By converting the average rate of accumulation of wet sediment to an average rate of dry sediment and estimating the reservoir

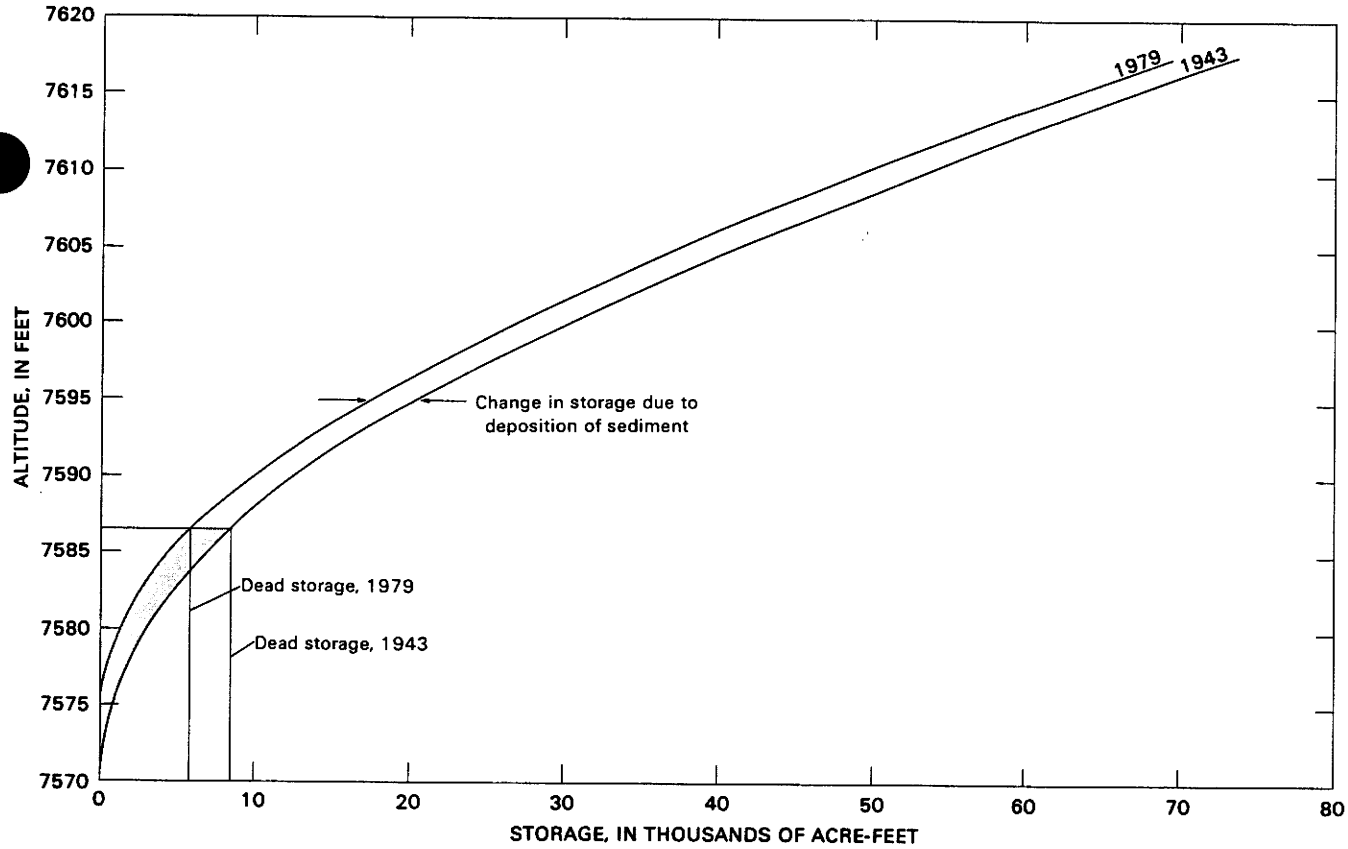

Figure 15. Relationship of reservoir altitude and storage during 1943 and 1979 and net change due to sediment deposition.

area in which the sediment was deposited, the average sediment yield from the drainage basin was estimated as 1.2 acre-foot per square mile per year. This is 2.5 times less than the rate of 0.5 acre-foot per square mile per year computed from the bathymetric surveys. Both estimates, however, are in the same range as the yield of 0.10 to 0.5 acre-foot per square mile per year that is indicated on the U.S. Department of Agriculture (1973) map for the drainage area upstream from Scofield Reservoir.

The bathymetric survey and radiochemical-dating techniques both have errors associated with the computed sediment yields. The 1943 bathymetric map has a 5-foot contour interval, whereas the 1979 map has a 1-foot contour interval. Future bathymetric surveys should yield accurate sedimentation rates provided that the cross sections (±0.5-foot depth) used in 1979 are duplicated with equivalent accuracy. In the radiochemical-dating technique, cores from only two sites were used and the samples were sliced into 7.5- to 10-centimeter sections. Radiochemical dating would provide more satisfactory results if samples were collected at more sites and the core were sliced into sections of perhaps 1 to 5 centimeters. Samples collected at sites L90, M5, M30, and M65 (fig. 2) would provide a much more accurate determination of sediment accumulation, especially if the homogeneity of the samples also were determined.

Particle Size

Particle or grain size is one of the most important factors in determining mechanisms and rates of transfer of solutes between lake or reservoir water and sediments. Because of the importance of surface reactions in lake sediments, fine-grained materials have the most potential for interaction with lake water. Surface areas of typical clay-size sediments are measured in square meters per gram, whereas sand-size sediments are measured in terms of square centimeters per gram (Jones and Bowser, 1978, p. 182).

To determine the quantity of clay-sized sediments near the inflow areas of Scofield Reservoir, core samples were collected at sizes M65 and L90 (fig. 2). The cores were separated into three equal sections and each section was analyzed for the percent of clay-size particles therein—that is, particles with a mean diameter of less than 0.004 millimeter. The percent particle size less than 0.004 millimeter diameter for the average depth of the core is shown in figure 18. At sites L90 and M65, the clay-sized fraction of the upper 20 centimeters ranged from about 16 to 26 percent of the sediment, and below 20 centimeters the clay-sized fraction ranged from 28 to 33 percent of the sediment.

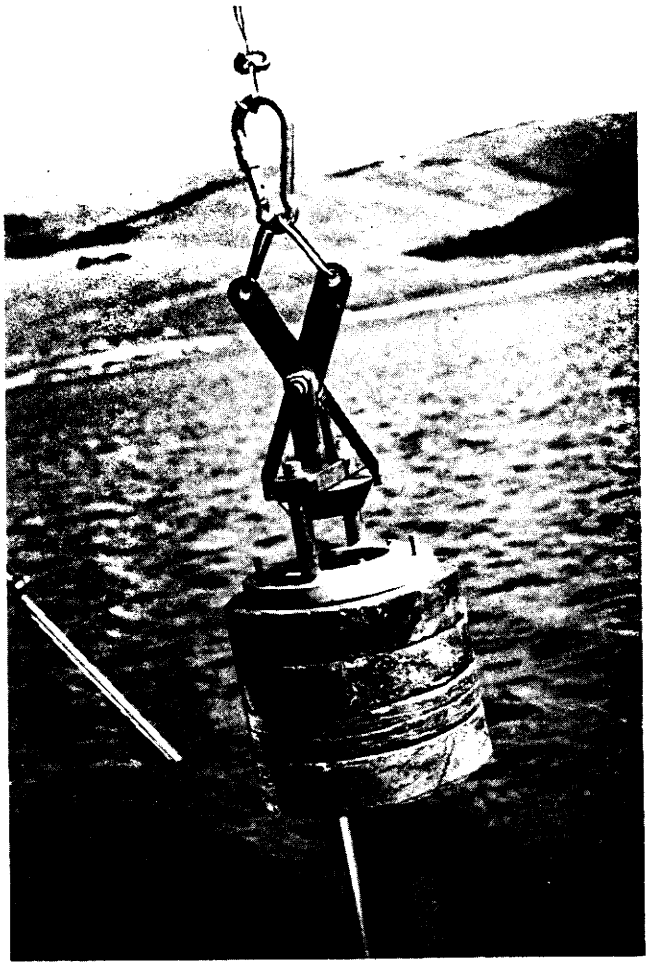

Figure 16. Sampling apparatus used for collecting cores of bottom sediments. (Photograph by Jeanette E. Dodge.)

Coal

The distribution of coal was determined in the cores from sites M30 and M65 (fig. 2). The vertical distribution of coal in the sediment and the approximate time of deposition are shown in figure 19. The core from site M65 near the inflow of Mud Creek had a considerable quantity of coal, most of which was deposited prior to about 1950. The core from site M30 near the middle of the reservoir had much less coal than the core from site M65; this is because site M30 is farthest from Mud Creek, the principal source of coal-bearing fluvial sediment. As at site M65, most of the coal at site M30 was deposited prior to about 1950.

Trace Metals and Other Minor Elements

Trace metals and other minor elements in the sediments were studied by the following methods:

1. Simulated anaerobic conditions were allowed to develop in water in contact with sediment cores, and then the concentration of selected trace elements was determined for the filtrate.
2. Trace elements were analyzed in the silicate, nonsilicate, and nondetrital phases of separate sediment cores using selective leaching techniques.

Simulated Anaerobic Environment

An experiment involving the development of an anaerobic environment was performed using cores collected from the reservoir at sites M30, R50, M65, and R90 (fig. 2) during September–October 1979. The experiment was performed in an attempt to determine the kinds of metals and other minor elements occurring during periods of stratification, and to provide guidelines for additional sampling of the water and sediments. During September–October 1979, when the first water samples were collected, the reservoir was well mixed and oxygenated; therefore, the concentration of dissolved metals and other minor elements in the deep layers was not representative of concentrations during periods of stratification when anaerobic or near anaerobic conditions are present.

During sampling, about 6 to 8 inches of water were trapped above the sediment cores in the 2-inch diameter, PVC core-sampling tubes. The tubes were capped, sealed, and stored in the laboratory at room temperature (approximately 25° Celsius) until sufficient time had elapsed for anaerobic conditions to develop in the columns of water. Then, in situ measurements of dissolved oxygen and pH were made. Water was siphoned off, filtered, and preserved for analyses of concentration of selected trace metals or elements and nitrogen.

Chemical analyses of the concentration of nitrate (NO_3,), nitrite (NO_2), and ammonia (NH_4), as well as that of major ions were made so that the redox potential (pE) could be calculated (table 9). The redox potential was computed using the WateQ2 model (Ball, Norstrom, and Jenne, 1980) and the model computation was based on the equilibria between ammonia (NH_4) and nitrate (NO_3) for the following reaction:

$$NO_3^- + 10H^+ + 8e^- = NH_4^+ + 3H_2O$$

It appeared, from consideration of the proximity of the core-sampling sites to inflowing streams, that pE varied according to the quantity of organic material

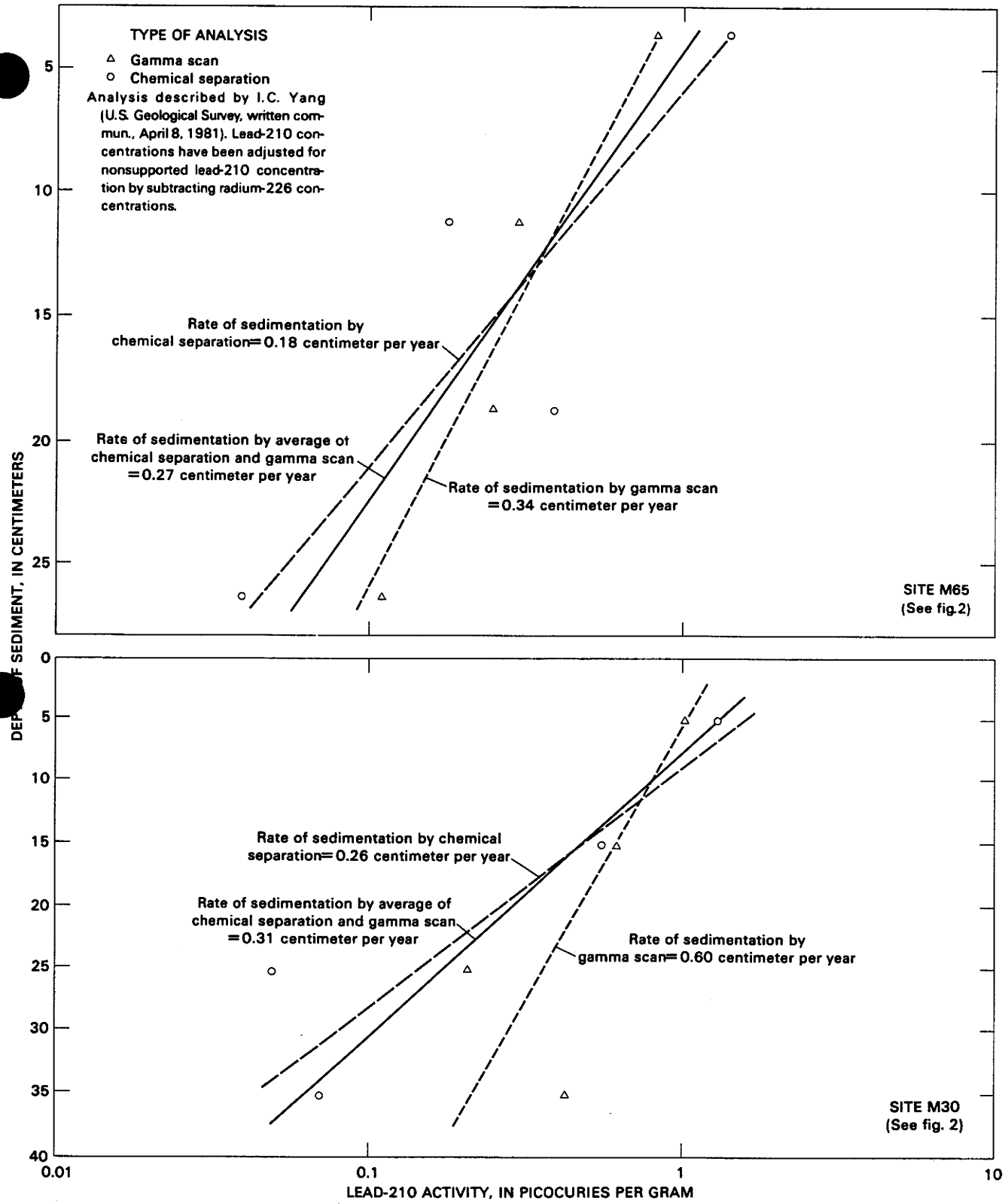

Figure 17. Relationship of relative lead-210 activity and depth of sediment, 1980.

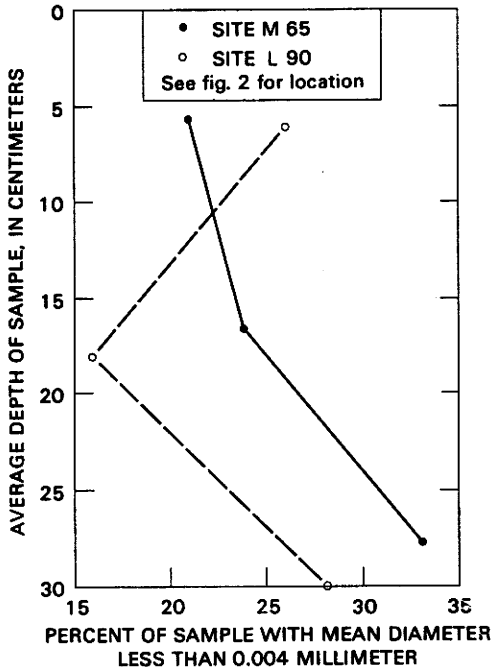

Figure 18. Relationship between depth and quantity of sediment with mean diameter less than 0.004 millimeter, August 1980.

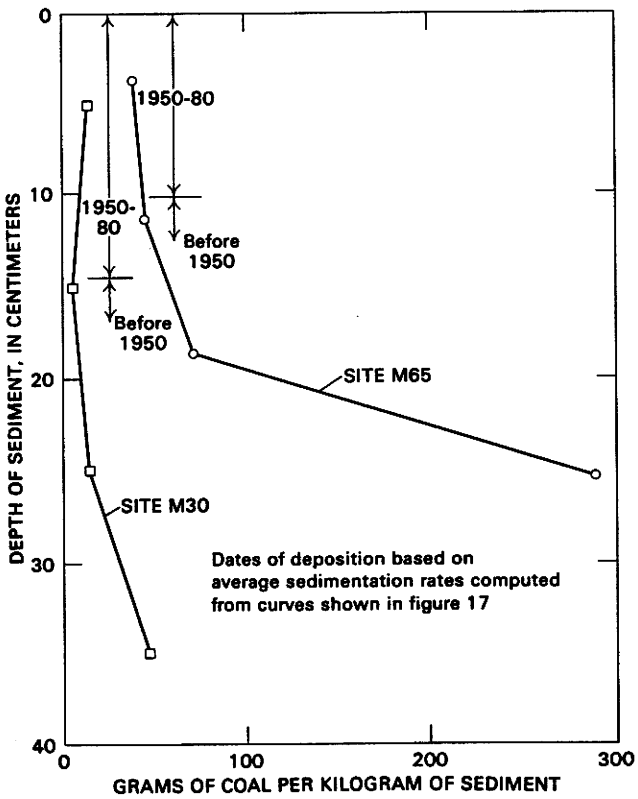

Figure 19. Vertical distribution of coal in sediment cores, 1980.

available (table 9). The smallest values of pE as well as the largest concentrations of manganese and iron occurred in the cores collected at sites near the tributary inflow (sites M65 and R90), whereas the largest values of pE and smallest concentrations of iron and manganese occurred at sites more distant from the inflow points (sites R50 and M30). Presumably, there would be more organic material deposited near the points of inflow to the reservoir, and the pE developed in a sealed sample from near those inflow points would be smaller.

The relationship between the concentration of the trace elements and of pH with pE are shown for each of the four sediment cores in figure 20. The concentrations of arsenic, iron, lead, and manganese increased inversely with pE, whereas zinc increased directly with pE. The concentration of dissolved metals in the simulated anaerobic environment suggests (but does not necessarily confirm) that the concentration of metals in the sediments are greater at a given site since the solubilities of the metals vary according to the redox state of the water.

The concentrations of metals in sediment in Scofield Reservoir could be a function of the availability of the metals as well as the redox state of the water. Therefore, to assess the effects of trace-metal transport to the reservoir, it was concluded that additional sediment sampling needs to focus on the quantities and solubility of metals in the sediments at sites both near the inflow from areas of coal mining and at various distances from these inflow sites.

Silicate, Nonsilicate, and Nondetrital Phases

Additional sediment cores at sites M30 and M65 were collected from Scofield Reservoir during August 1980. The cores were sliced into sections and analyzed by the U.S. Geological Survey's laboratory in Denver, Colorado, for arsenic, cobalt, copper, nickel, mercury, lead, zinc, manganese, iron, lead-210, coal, and loss on ignition. Several of the metals are potentially toxic pollutants and the effect of metal-enriched sediments on benthic organisms and fish has been noted by several investigators, including Bryan and Hummerstone (1973) and Ayling (1974).

The metals were partitioned into the silicate, nonsilicate, and nondetrital phases using leaching experiments described by Skei and Paus (1979, p. 240–241). The U.S. Geological Survey laboratory performed the chemical analyses of the sediments using methods that were slightly modified (methods 1–3) from those presented by Skei and Paus. These methods are described by Delora Boyle (U.S. Geological Survey, written commun., April 8, 1981).

Total extractable metals (method 1). A 0.5-gram portion of dried sediment was transferred to the teflon beaker used in the decomposition bomb. Five milliliters of hydrofluoric acid, 3 milliliters of hydrochloric acid, and 3 milliliters of nitric acid were added to the sample.

Table 9. Values of pH and pE, and concentration of dissolved oxygen, nitrogen, and dissolved metals and elements from water in contact with sediment cores

[Site: See figure 2 for location]

	Site M30	Site R50	Site M65	Site R90
Temperature (degrees Celsius)	25.0	24.0	24.0	24.0
pH	6.84	6.55	6.95	7.13
pE	6.56	7.01	6.02	6.14
Milligrams per liter				
Dissolved oxygen	.10	.25	.12	.50
Ammonia (NH_4 as N)	.011	.019	8.4	.124
Nitrite (NO_2 as N)	.009	.005	.014	.022
Nitrate (NO_3 as N)	.561	3.2	.046	.878
Micrograms per liter				
Arsenic (As)	2	1	4	1
Beryllium (Be)	0	0	0	0
Cadmium (Cd)	1	4	1	0
Chromium (Cr)	10	0	0	0
Copper (Cu)	2	5	1	3
Iron (Fe)	30	60	4,000	120
Lead (Pb)	3	2	3	5
Manganese (Mn)	20	40	720	220
Mercury (Hg)	0	0	0	0
Nickel (Ni)	5	3	3	5
Selenium (Se)	0	0	0	0
Zinc (Zn)	10	20	10	10

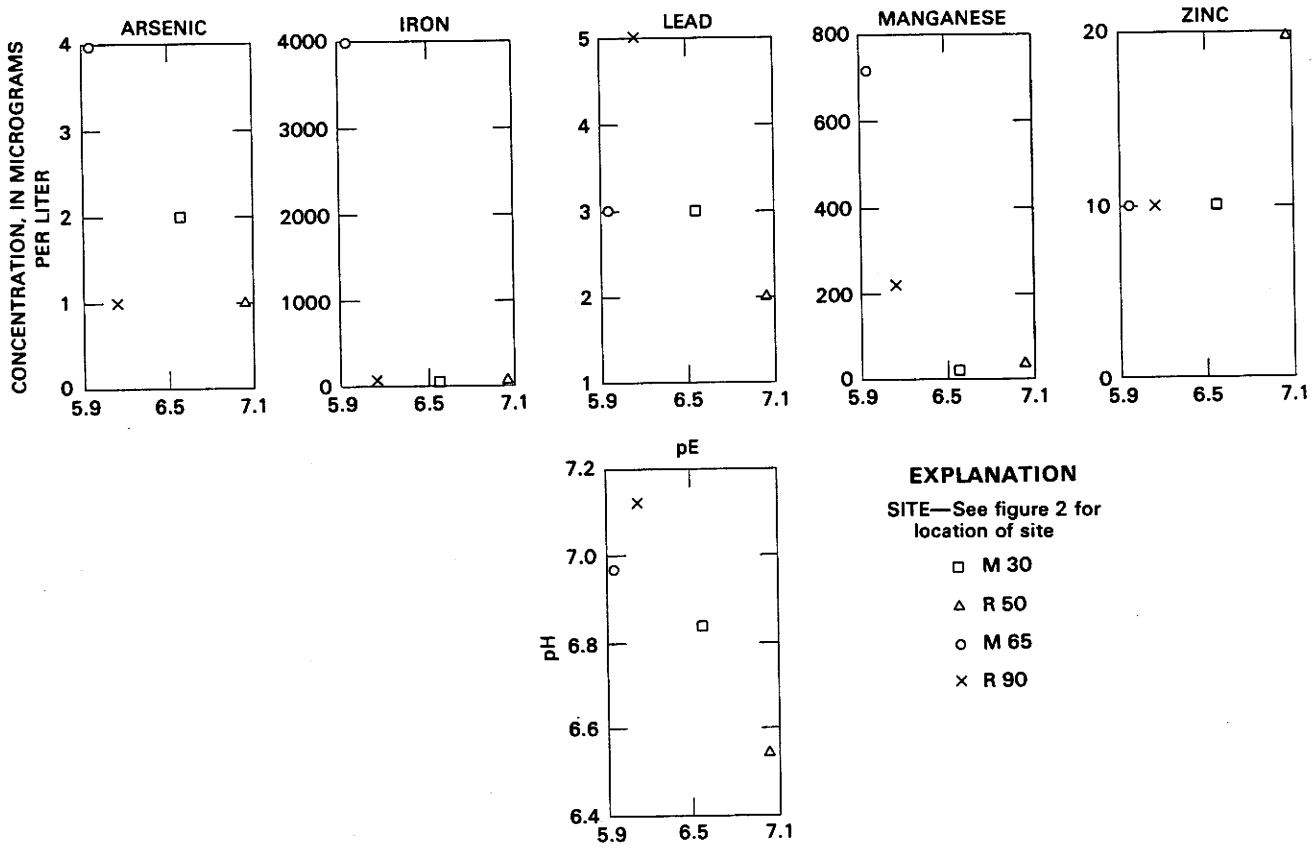

Figure 20. Relation of concentration of dissolved trace metals to pE, and of pH to pE for an artificially developed anaerobic zone, October 1979.

The bomb was then sealed and placed in an oven at 120° Celsius for 2 hours. After cooling, the liquid from the bomb was placed in 50 milliliters of saturated boric acid solution. Because there was some insoluble material present, the solution was filtered through a Whatman 40 filter and diluted to 100 milliliters prior to analysis.

Nonsilicate extractable metals (method 2). A 0.5-gram portion of sample was transferred to a round-bottom flask equipped with a condenser. After careful addition of 5 milliliters of concentrated nitric acid and 1.5 grams of potassium bromide, the resulting mixture was refluxed for 2 hours. The digested mixture was diluted to about 40 milliliters, filtered through a Whatman 40 filter, and diluted to 50 milliliters prior to analysis.

Nondetrital extractable metals (method 3). One gram of dried sediment was transferred to an Erlenmeyer flask. One hundred fifty milliliters of 20-percent acetic acid was added and the flask was shaken for 12 hours at room temperature. The solutions were then filtered through a Whatman 40 filter and diluted to 250 milliliters prior to analysis.

Nondetrital extractable metal is considered to be easily removable (and probably available to biota). Included are metals bound in the easily soluble amorphous compounds of manganese and iron, and metals loosely held in ion-exchange and sorbed positions or attached to organic matter. Also included are metals in water that fills intergranular spaces of the sediments. The nonsilicate extractable metal is considered to include all metals (including the nondetrital) except those bound in the silicate minerals. The quantities of metals bound in the silicate and oxide minerals may be determined as the difference between the total extractable metals (method 1) and the nonsilicate extractable metals (method 2). The quantities of metal held tightly in organic material, in sulfides, or strongly attached to clays may be determined as the difference between the nonsilicate extractable metal (method 2) and the nondetrital extractable metal (method 3). Loss on ignition provides an estimate of the quantity of organic matter.

The results of the analyses (tables 10 and 11) were plotted in figures 21 and 22 to show the depth variation of trace metals for the three leaching tests. In addition, the differences of concentration between methods 1 and 2 and between 2 and 3 are differentiated by shading to show the additional metal solubilized by progressively stronger leaching tests. For example, the light shading represents the quantity of metal bound in the silicate and oxide minerals (method 1 minus method 2); the intermediate shading represents the quantity of metal tightly held in the organic material, in sulfides, or strongly adsorbed to clays (method 2 minus method 3); and the dark shading is the nondetrital or easily soluble metal. The concentration of metals determined as the difference between methods 2 and 3 are, hereafter, referred to as the "sulfide fraction."

Total extractable arsenic ranged from 0.00 to 0.80 part per million at site M30 and from 0.20 to 0.40 part per million at site M65. The largest concentration occurred in the near-surface section at site M30, but there is no apparent arsenic enrichment near the surface at site M65. Most of the arsenic at both sites occurred in either the nondetrital (easily soluble) or silica-bound (difficult solubility) fractions.

Total extractable cobalt ranged from 40 to 50 parts per million at site M30 and from 30 to 50 parts per million at site M65. The largest concentrations occurred in the near-surface sections at both sites. Cobalt occurred in the silica-bound fraction (with a small quantity occurring in the nondetrital fraction) at both sites.

Total extractable copper ranged from 15 to 48 parts per million at site M30 and from 10 to 40 parts per million at site M65. The largest concentration occurred in the near-surface section at site M30 but in a deeper section at site M65. Some silica-bound copper occurred in the near-surface section at site M30, but otherwise most of the copper occurred in either the nondetrital or sulfide fraction at both sites.

Total extractable nickel ranged from 50 to 60 parts per million at site M30 and from 20 to 70 parts per million at site M65. The largest concentrations occurred in the near-surface section at site M30, and in a deeper section at site M65. At both sites most of the nickel occurred in the silica-bound fraction and a small quantity occurred in the nondetrital fraction.

Total extractable mercury ranged from 0.08 to 0.46 part per million at site M30 and from 0.08 to 0.20 part per million at site M65. The largest concentrations occurred in the deepest section at site M30 and near the surface at M65. Virtually all of the mercury at both sites occurred in the silica-bound fraction, which is the least soluble fraction. The maximum concentration of mercury in the nondetrital and easily soluble fraction was 0.02 part per million at both sites.

Total extractable lead ranged from 40 to 60 parts per million at site M30 and from 20 to 50 parts per million at site M65. The largest concentrations occurred in the near-surface sections at both sites. Lead occurred in the nondetrital, sulfide, and silica-bound fraction at site M30 but only in the sulfide and silica-bound fraction at site M65. In the near-surface section at site M30, about one-half of the lead occurred in the nondetrital fraction and about equal quantities occurred in the sulfide and silica-bound fraction. In the near-surface section at site M65, approximately equal quantities of lead occurred in the sulfide and silica-bound fractions.

Total extractable zinc ranged from 62 to 116 parts per million at site M30 and from 42 to 88 parts per million at site M65. The largest concentrations of total extractable zinc occurred in the near-surface sections,

Table 10. Chemical analyses of sediment cores from site M30, August 1980

[See figure 2 for location of site. Method: 1, total extractable metal; 2, nonsilica extractable metal; 3, nondetrital extractable metal]

Depth of sediment (centimeters)	Loss on ignition (percent)	Method	Parts per million								
			Arsenic	Cobalt	Copper	Nickel	Mercury	Lead	Zinc	Manganese	Iron
0–10	0.9	1	0.80	50	48	60	0.38	60	116	526	13,600
		2	—	10	28	27	.00	40	58	468	13,500
		3	.25	10	13	25	.02	25	20	493	4,200
10–20	1.0	1	.80	40	33	60	.08	50	96	332	14,000
		2	—	10	31	27	—	40	63	373	14,300
		3	.50	10	19	25	.02	25	25	343	4,025
20–30	.7	1	.00	40	15	50	.20	50	64	442	12,200
		2	—	10	20	15	.00	20	38	398	8,900
		3	.25	10	19	12.5	.02	.00	15	435	3,625
30–41	.8	1	.40	40	20	50	.46	40	62	368	11,200
		2	—	10	17	15	.02	—	34	323	9,900
		3	.00	10	13	12.5	.02	—	13	358	2,800

Table 11. Chemical analysis of sediment cores from site M65, August 1980

[See figure 2 for location of site. Method: 1, total extractable metal; 2, nonsilica extractable metal; 3, nondetrital extractable metal]

Depth of sediment in centimeters	Loss on ignition (percent)	Method	Parts per million								
			Arsenic	Cobalt	Copper	Nickel	Mercury	Lead	Zinc	Manganese	Iron
0–7.5	1.0	1	0.40	50	20	40	0.20	50	88	374	14,200
		2	—	10	28	15	.00	20	43	304	10,000
		3	.25	10	19	12.5	.00	0	35	305	2,900
7.5–15	.8	1	.20	30	10	20	.16	20	42	162	7,660
		2	—	10	17	5	.00	5	37	163	7,400
		3	.00	10	13	12.5	.02	0	28	165	1,700
15–22.5	.8	1	.40	30	40	70	.18	40	56	252	9,660
		2	—	10	20	10	.00	20	36	276	7,000
		3	.00	10	13	12.5	.00	25	30	268	2,325
22.5–30	.6	1	.40	40	15	30	.08	20	42	272	9,360
		2	—	10	17	10	.00	20	30	208	5,900
		3	.00	0	13	12.5	.02	20	18	203	1,550

with generally decreasing concentrations with depth at both sites. Zinc occurred in the nondetrital, sulfide, and silica-bound fractions at both sites, and at site M30 the concentration in all three fractions generally decreased with depth.

Total extractable manganese ranged from 332 to 526 parts per million at site M30 and from 162 to 374 parts per million at site M65. The largest concentrations occurred in near-surface sections at both sites, and virtually all of the manganese was in the nondetrital fraction at both sites.

Total extractable iron ranged from 11,200 to 14,000 parts per million at site M30 and from 7,600 to 14,200 parts per million at site M65. The largest concentrations occurred in the near-surface section at site M65 and in a deeper section at site M30. The iron occurs in all three fractions but most was in the nondetrital and sulfide fractions at both sites.

The differences between the concentration of trace metals in the sediments near the inflow of Mud Creek (site M65) and those in the middle of the reservoir (site M30) were too small to indicate that sediments related to coal mining in the Mud Creek drainage have affected the trace-metal characteristics of the bottom sediments of the reservoir. Sediments deposited at site M65 clearly contain more coal than do the sediments deposited at site M30; however, the concentrations of most of the trace metals in the near-surface sediments at site M65 were no larger than at site M30.

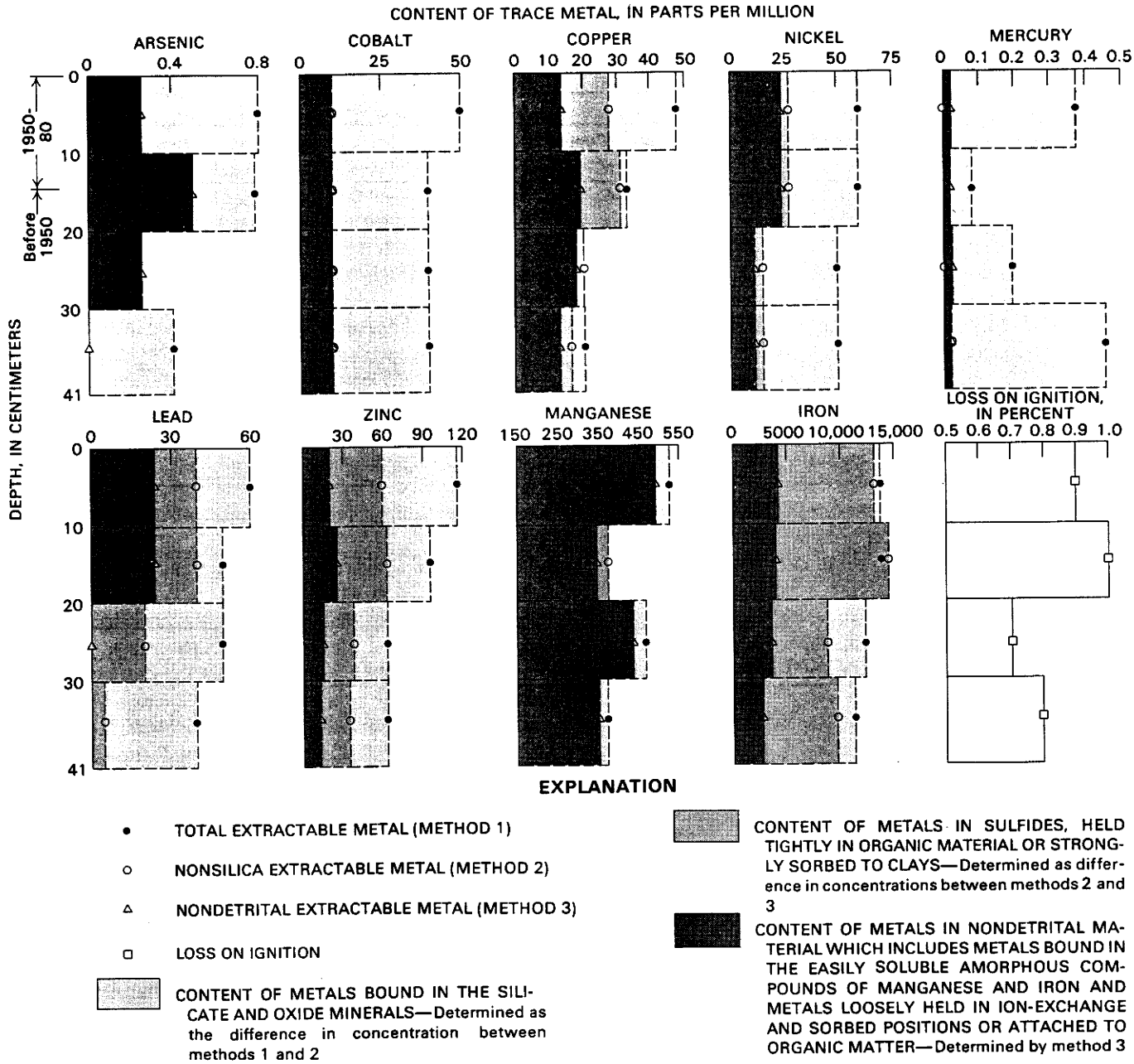

Figure 21. Vertical profiles of trace metals extracted from sediments by selective leaching methods and loss on ignition in sediment cores from site M30, 1980. (Site M30 is shown in fig. 2.)

The data are not sufficient to indicate a trend of trace-metal enrichment in the near-surface sediments. It should be noted, however, that the largest total extractable concentrations of seven of the nine metals occurs in the near-surface layer of sediment at both sites. Most of those metals occur in either the nondetrital (method 3) or silica-bound fractions (method 1 minus method 2). Only iron, zinc, lead, and copper had significant quantities of metals that occurred in the sulfide fraction (method 2 minus method 3).

More detailed studies of the sediments in Scofield Reservoir are needed, and the following procedures are needed for those studies:

1. Collect cores at site L90 near the inflow of Fish Creek, at site M5 near the dam, as well as additional cores at sites M30 and M65. The cores need to be limited to the upper 20 centimeters at each site and sliced into sections of perhaps 1 to 5 centimeters.
2. Perform chemical analyses of the cores using the selective leaching tests described in this report.

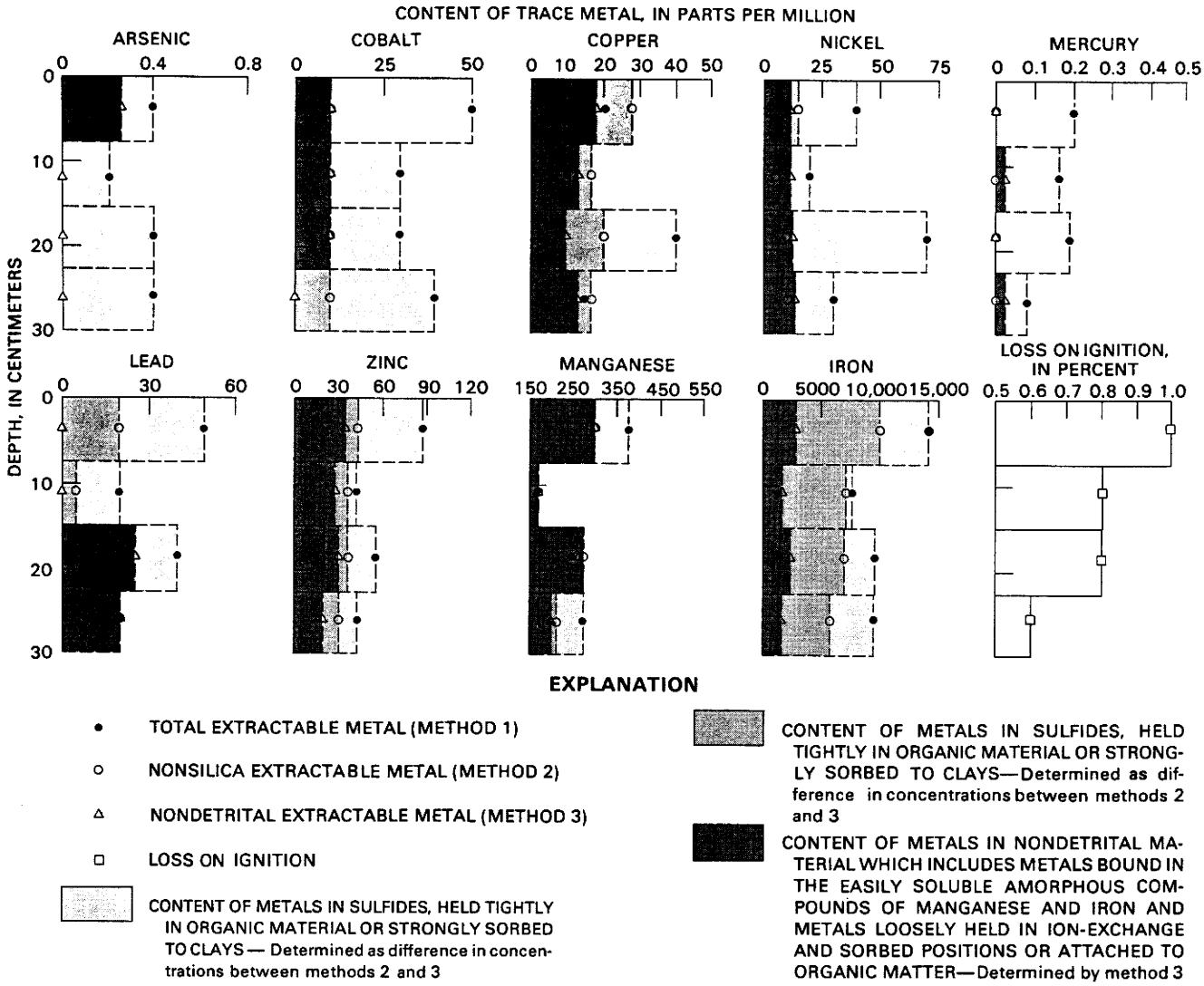

Figure 22. Vertical profiles of trace metals extracted from sediments by selective leaching methods and loss on ignition in sediment cores from site M65, 1980. (Site M65 is shown in fig. 2).

3. Monitor sediment concentrations in Eccles Canyon during both thunderstorm and snowmelt runoff. Sufficient data need to be collected to compute total sediment loads. The type and quantity of trace metals and other minor elements associated with the sediments also need to be determined.

EFFECTS OF THE RESERVOIR ON THE QUANTITY AND TEMPERATURE OF WATER IN THE PRICE RIVER

During October 1, 1979–August 31, 1980, the outflow from Scofield Reservoir as measured at site S37 on the Price River (fig. 2) was 67,500 acre-feet (table 5). Approximately 55,000 acre-feet of water was stored in the reservoir on August 31, 1980, and 46,500 acre-feet on October 1, 1979, representing an increase in storage of 8,500 acre-feet. Evaporation from and precipitation on the reservoir was estimated from National Oceanic and Atmospheric Administration records at Scofield Dam to be about 8,000 and 2,900 acre-feet, respectively. (See, for example, National Oceanic and Atmospheric Administration, July 1980.) The quantity of bank storage is undetermined and is incorporated with the residual quantity of unmeasured inflow, which was calculated to be 2,000 acre-feet. Neglecting bank storage, the net depletion to the Price River was the quantity lost to evaporation (8,000 acre-feet), which was about 10 percent of the total inflow. This depletion is more than offset by the regulated more uniform flow in the river downstream from the reservoir and the flood protection, recreation, and beneficial use of flows that would be lost without the reservoir.

Streamflow temperatures were monitored during

the 1980 water year to determine the reservoir's effect on the temperature of the Price River. The average monthly temperatures at site S2 on Fish Creek upstream from the reservoir and site S37 on the Price River downstream from the dam are illustrated in figure 23. The water is released from the dam at an altitude of 7,586 feet, where its temperature parallels, but is slightly greater than, that measured in the reservoir at site M5 for that level (fig. 9).

The average monthly temperatures of the Price River ranged from 3.5° Celsius during December to 18.8° Celsius during July, whereas the average monthly temperature of Fish Creek ranged from 0.0° Celsius during December to 18.6° Celsius during July. The largest difference in temperature between those inflow and outflow sites occurred between November and January, when the temperature of the outflow was about 4° Celsius warmer than that of inflow from Fish Creek.

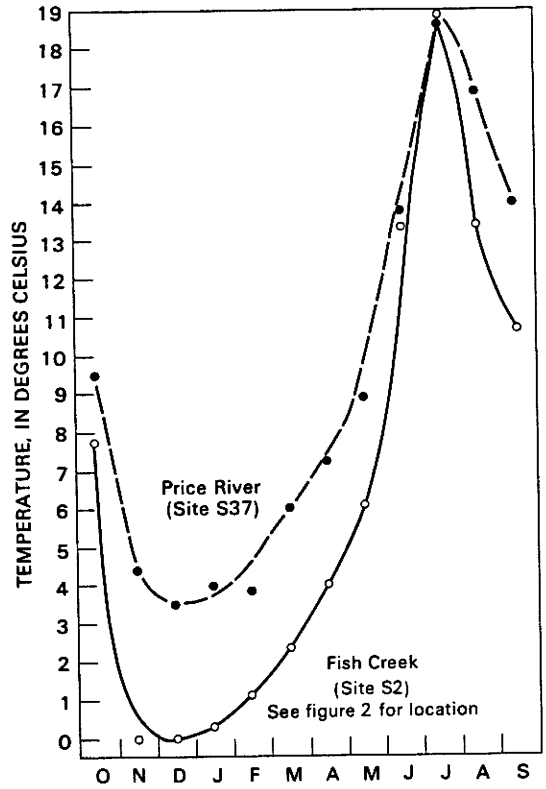

Figure 23. Temperature of Fish Creek upstream from Scofield Reservoir and of Price River downstream from Scofield Reservoir, 1980 water year.

SUMMARY AND CONCLUSIONS

1. During the first 11 months of the 1980 water year, Fish Creek contributed 72 percent, Pondtown Creek 6 percent, and Mud Creek 16 percent of the inflow to Scofield Reservoir. Precipitation on the reservoir and inflow from other small tributaries (unmeasured) and ground-water seepage contributed the remaining 6 percent of the inflow.

2. Based on the records of Fish Creek, inflow to the reservoir during the 1980 water year was about 80 percent greater than the 1938–81 annual average inflow.

3. During October 1, 1979–August 31, 1980, the discharge-weighted average concentration of dissolved solids in the combined inflow of Fish, Pondtown, and Mud Creeks was 195 milligrams per liter. The discharge-weighted average concentration in the outflow for the same period was 175 milligrams per liter. The predominant ions in the inflow, the reservoir, and the outflow were calcium and bicarbonate. Chemical precipitation of calcium carbonate in the reservoir is believed to have caused most of the 20-milligram-per-liter decrease of concentration between the inflow and the outflow.

4. The concentration of total nitrogen and phosphorus was large in most inflowing streams during April–June 1980, and most of the total loads of those constituents were produced during that high-runoff period.

5. During October 1, 1979–August 31, 1980, the estimated discharge-weighted average concentration of total nitrogen in the combined inflow of Fish, Pondtown, and Mud Creeks, was 1.1 milligrams per liter (0.8 dissolved + 0.3 suspended). The discharge-weighted average concentration of total phosphorus in the combined inflow was 0.06 milligram per liter (0.01 dissolved + 0.05 suspended).

6. Unusually large concentrations of nitrogen and phosphorus occurred in runoff from Eccles Canyon during May 1980. The large concentrations probably are associated with flushing of residual debris left in the basin during clearing of the forest land in an underground coal development area.

7. During October 1, 1979–August 31, 1980, the discharge-weighted average concentration of total nitrogen in the outflow from the reservoir was 0.9 milligram per liter (0.6 dissolved + 0.3 suspended), and that of total phosphorus was 0.03 milligram per liter (0.01 dissolved + 0.02 suspended). The large decrease of concentration of phosphorus between the combined inflow and the outflow is due in part to settling of suspended matter or use through photosynthetic processes in the reservoir or both.

8. The trophic state of Scofield Reservoir was evaluated on the bases of the nutrient content of the inflow, of water in storage, of the outflow, and of dissolved-oxygen depletion during the summer stratification period. The data indicate that the reservoir is either mesotrophic or borderline between mesotrophic and eutrophic, and that it may become highly eutrophic unless corrective measures are taken to limit nutrient inflow.

9. In order to detect the possibility of increasing productivity and eutrophication of Scofield Reservoir, nutrients need to be monitored in Mud Creek and in the

outflow from the reservoir. Also, seasonal data need to be collected from the reservoir at a site near the dam.

10. Scofield Reservoir is dimictic with turnovers in the spring and fall. Direct thermal stratification occurred during the summer months between the periods of turnover. Maximum thermal and chemical stratification occurred in late July just prior to the autumn turnover.

11. Except during the turnover periods, dissolved oxygen was considerably depleted below an altitude of 7,590 feet, where about 20 percent of the water is stored. The brief period during and following the turnover was the only time when anaerobic conditions did not exist below an altitude of about 7,580 feet. During the summer stratification period, which began after the spring turnover, the depletion of dissolved oxygen in the deeper layers of water was paralleled by supersaturated concentration in the shallow layer. The simultaneous occurrence of depletion and supersaturation occurred as a result of photosynthetic processes.

12. During September–October 1979 and August 1980, the concentration of dissolved arsenic, lead, and mercury in Scofield Reservoir did not exceed the maximum contaminant levels set by the U.S. Environmental Protection Agency for public-water systems.

13. Bathymetric profiles made at selected reservoir cross sections during September 1979 can be used to assess future rates of sediment deposition.

14. Sediment deposition in Scofield Reservoir during 1943–79 was estimated to be 3,000 acre-feet. The average annual sediment yield of the reservoir's drainage basin, as determined from bathymetric surveys and dating with radioisotopes, ranged from 0.2 to 0.5 acre-foot per square mile.

15. Most of the coal deposition in the reservoir occurred prior to about 1950. Since 1943, the deposition of sediment has decreased the storage capacity of Scofield Reservoir by about 4 percent.

16. The difference between the concentration of trace metals in the sediments near the inflow of Mud Creek and those in the middle of the reservoir was too small to indicate that sediments related to coal mining have affected the trace-metal characteristics of the sediments. The concentration of total extractable mercury in the sediments near the inflow of Mud Creek ranged from 0.08 to 0.20 part per million, and at a site near the middle of the reservoir the concentration ranged from 0.08 to 0.46 part per million. However, virtually all of the mercury is silica bound, which is the least soluble fraction. The maximum concentration of mercury in the nondetrital and easily soluble fraction was 0.02 part per million at both sites.

17. Fluvial sediment needs to be monitored in Eccles Canyon to determine the effects of clearing of forested land for coal development. Both thunderstorm and snowmelt runoff need to be monitored so that sufficient data are collected to compute sediment loads.

18. Trace metals in the sediment in the streams and in Scofield Reservoir need to be studied in greater detail.

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Winter Quarters Canyon
Data Adequacy

October 1992

HYDROLOGY OF THE PRICE RIVER BASIN, UTAH WITH EMPHASIS ON SELECTED COALFIELD AREAS USGS, WATER SUPPLY PAPER 2246

Hydrology of the Price River Basin, Utah with emphasis on Selected Coal-Field Areas

By K. M. Waddell, J. E. Dodge, D. W. Darby, *and* S. M. Theobald

Prepared in cooperation with the
U.S. Bureau of Land Management

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2246

5.00

Hydrology of the Price River Basin, Utah with emphasis on Selected Coal-Field Areas

United States Geological Survey Water-Supply Paper 2246

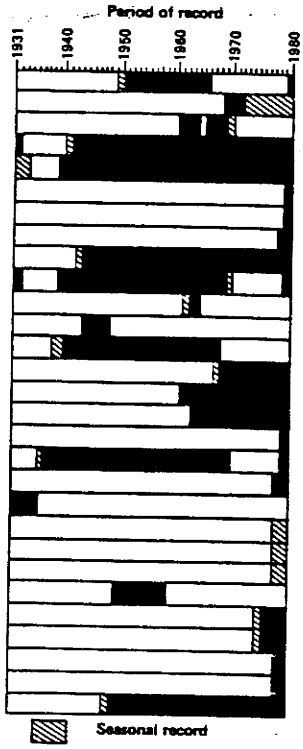
Prepared in cooperation with the U.S. Bureau of Land Management

Table 1. Published stream-gaging records and ranges of annual discharge, 1931–80 water years

Site No.: See figure 1 for location.

Data source: 1, 1931–80, U.S. Geological Survey annual reports on stream measurements issued as Water-Supply Papers, Surface Water Supply of the United States, Colorado River Basin; 2, 1961–64, U.S. Geological Survey annual reports of Surface-Water Records of Utah; 3, 1965–74, U.S. Geological Survey annual reports of Water-Resources Data for Utah, Part 1, Surface -Water Records; 4, 1975–80, U.S. Geological Survey annual reports of Water-Resources Data for Utah.

Site No.	Gaging station No.	Name	Minimum annual discharge: Acre-feet per year	Minimum annual discharge: Water year	Maximum annual discharge: Acre-feet per year	Maximum annual discharge: Water year	Data source
S0.1	09309500	Fairview Ditch near Fairview	597	1961	2,410	1957	1,2,3,4
S0.3	09309600	Fairview Tunnel near Fairview	1,740	1971	2,410	1969	3,4
S0.5	09309800	Gooseberry Creek near Fairview	3,150	1961	10,070	1962	1,2,3
S1	09310000	Gooseberry Creek near Scofield	3,370	1977	29,520	1952	1,2,3,4
S2	09310500	Fish Creek above reservoir, near Scofield	7,350	1977	77,980	1952	1,2,3,4
S4	09310550	Pondtown Creek near Scofield	(1)	1980	–	–	4
S29	09310600	Eccles Canyon near Scofield	(1)	1980	–	–	4
S36	09310700	Mud Creek below Winter Quarters Canyon, at Scofield	6,160	1979	13,470	1980	4
S36.5	09311000	Scofield Reservoir near Scofield	(2)	–	(2)	–	1,2,3,4
S37	09311500	Price River near Scofield	13,760	1961	96,660	1952	1,2,3,4
S37.02	09311700	Price River near Soldier Summit	35,380	1963	39,680	1962	2
S37.04	09312000	North Fork White River near Soldier Summit	3,670	1946	5,670	1944	1
S37.06	09312500	White River near Soldier Summit	3,000	1961	48,020	1952	1,2,3
S37.1	09312600	White River below Tabbyune Creek, near Soldier Summit	1,600	1977	31,090	1980	3,4
S37.2	09312700	Beaver Creek near Soldier Summit	262	1977	5,650	1980	2,3,4
S37.3	09312800	Willow Creek near Castle Gate	549	1977	14,690	1979	2,3,4
S37.4	09312900	Willow Creek at Castle Gate	(1)	–	–	–	4
S37.45	09313000	Price River near Heiner	18,340	1961	225,300	1952	1,2,3,4
S37.5	09313040	Spring Canyon below Sowbelly Gulch, at Helper	90	1979	253	1980	4
S37.55	09313500	Price River near Helper	26,390	1934	64,700	1933	1
S37.7	09313965	Coal Creek near Helper	–	–	–	–	4
S59	09313975	Soldier Creek below mine, near Wellington	–	–	–	–	4
S60	09313985	Dugout Creek near Sunnyside	–	–	–	–	4
S60.2	09314000	Price River below Coal Creek, near Wellington	15,480	1956	208,800	1952	1
S60.4	09314250	Price River below Miller Creek, near Wellington	15,740	1977	147,000	1980	3,4
S60.6	09314280	Desert Seep Wash near Wellington	6,010	1977	27,270	1980	3,4
S61	09314340	Grassy Trail Creek at Sunnyside	5,080	1979	8,220	1980	4
S62	09314374	Horse Canyon near Sunnyside	293	1979	310	1980	4
S63	09314500	Price River at Woodside	22,670	1977	247,800	1952	1,2,3,4



[1] Only 1 year of record available.

[2] Reservoir contents.

Table 2. Water budget for selected basins, 1971–80 water years

Site No.: See figure 1 for location.

Evapotranspiration: Computed from relationship; evapotranspiration is equal to average annual precipitation minus average annual streamflow.

Site No.	Stream	Drainage area (acres)	Average annual precipitation (inches)	Average annual streamflow: Acre-feet	Average annual streamflow: Inches	Evapotranspiration (inches)
S2	Fish Creek	38,500	32	36,430	11	21
S37.1	White River	48,400	22	20,100	5	17
S37.2	Beaver Creek	16,700	23	2,860	2	21
S37.3	Willow Creek	40,200	18	5,900	2	16
					Average	19

tics for the sites given in table 3. Most of the selected sites are either near the base of the Blackhawk Formation or in an area of active or planned coal mining (fig. 1).

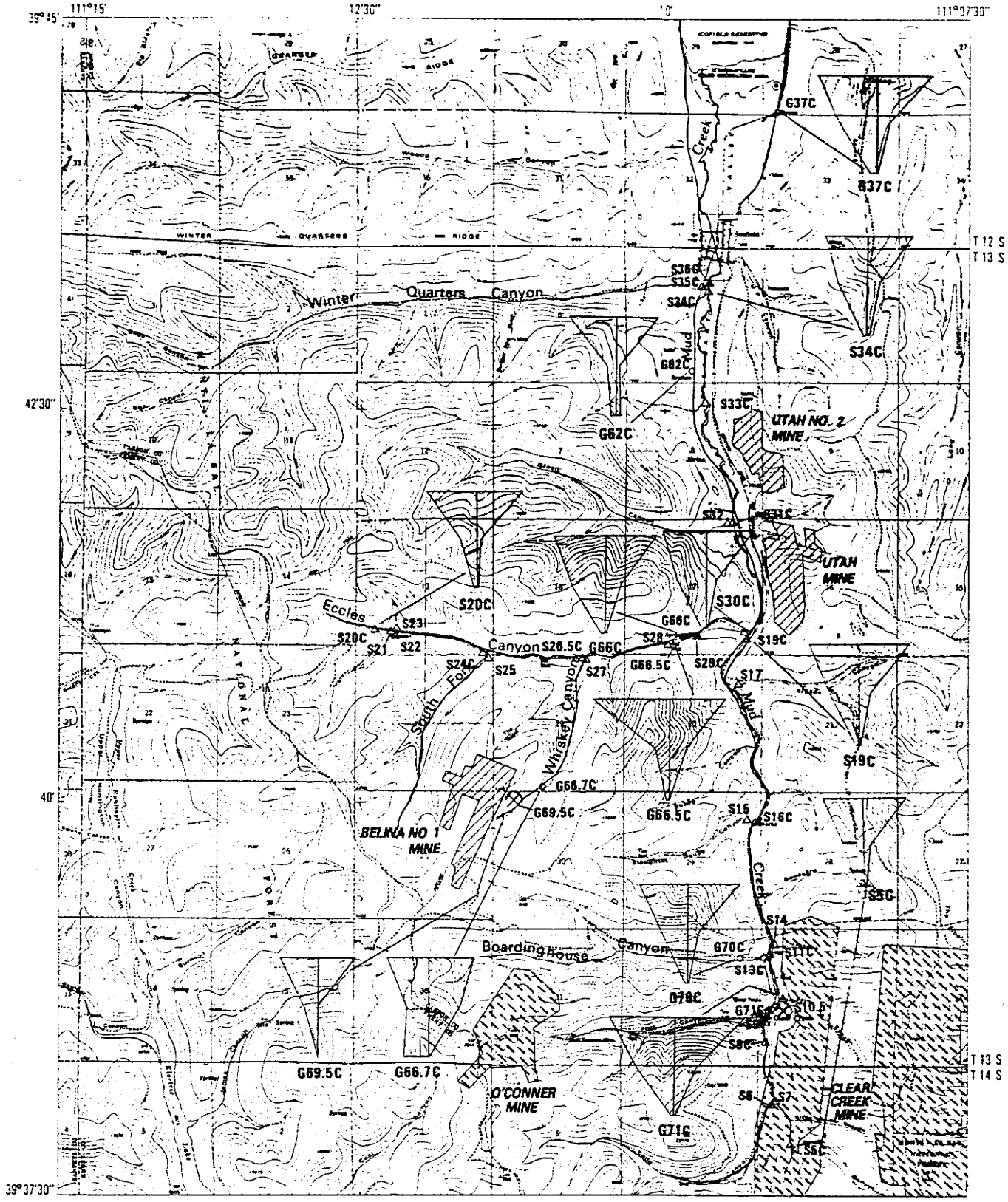
Quality of Surface Water

Chemical Quality

Streams

Considerable data for defining the chemical quality of water have been collected on streams in the Price River basin since 1969. Mundorff (1972) described the inorganic chemistry of the water in relation to geology and the effects of water use, including irrigation. Waddell and others (1981) prepared maps showing the range of dissolved solids and inorganic chemical composition as related to the geology. Lines and Plantz (1981) presented a summary of water-quality data for stream sites that began operation in 1978 as part of the U.S.Geological Survey's coal-hydrology monitoring program. Their data included inorganic, organic, and biologic constituents. Ponce and Hawkins (1978) studied the mechanics of salt pickup from overland flow on the Mancos Shale.

In this study, emphasis was placed on nutrients and inorganic constituents, including trace metals and major ions. The inorganic data were collected primarily



Base from U.S. Geological Survey
Scofield, 1:24,000, 1979

Hydrology by K.M. Waddell, 1981

EXPLANATION

HYDROLOGIC DATA SITE AND NUMBER—G preceding number indicates a ground-water site; S preceding number indicates a surface-water site; C after number indicates chemical analysis available (Waddell and others; 1982, table 8 or 11)

△ S17 SEEPAGE - STUDY SITE

G37C SPRING

○ G66.7 WELL

▲ G37C GAGING STATION

G71C MINE PORTAL

ACTIVE COAL MINE

INACTIVE COAL MINE

WATER-QUALITY DIAGRAM (FROM STIFF, 1951)

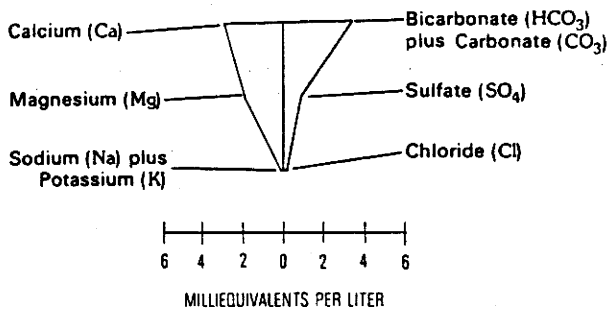


Figure 2. (above and facing page) Seepage-study sites and quality of ground and surface water in the Mud Creek drainage basin, 1979–80.

temperature, pH, and dissolved oxygen were made at 19 sites, and chemical analyses for the major inorganic ions, trace metals, and nutrients were made at 9 of the sites (fig. 4). The purpose of the sampling was to determine: (1) If anaerobic conditions occurred seasonally in the reservoir, (2) sources and quantity of nutrient loading, and (3) concentration and distribution of trace metals in the reservoir. Only a summary of the results is included in this report.

The three perennial streams that flow into Scofield Reservoir are Fish, Mud, and Pondtown Creeks. The largest stream is Fish Creek, which during the 1971-80 water years had an average annual discharge of about 36,430 acre-feet. During the 1980 water year, Fish Creek had a discharge of 61,690 acre-feet, Mud Creek 13,470 acre-feet, and Pondtown Creek 5,380 acre-feet. The drainage of Mud Creek is in an area with a history of underground mining, and recently mining has accelerated. Little mining has occurred in the drainage of Pondtown Creek.

Storage of water in Scofield Reservoir began in 1926. The usable storage capacity was increased in 1945 when a rockfill dam was constructed about 800 feet downstream from the original dam. In 1945, the usable capacity of the reservoir was 65,780 acre-feet, and dead storage was 8,000 acre-feet. Scofield Reservoir regulates the flow of the Price River. The reservoir provides water for irrigation in the vicinity of the city of Price, and it also provides flood control and recreational facilities.

During September-October 1979, the reservoir water was well mixed. Temperature, specific conductance, concentration of dissolved oxygen, and pH were homogeneous vertically and areally throughout the reservoir. Temperature ranged from about 13° to 15° Celsius, and the concentration of dissolved solids, as estimated from specific conductance, ranged from about 140 to 180 milligrams per liter and averaged about 170 milligrams per liter. The water was well oxygenated, with the concentrations of dissolved oxygen ranging from about 8 to 12 milligrams per liter. The pH ranged from about 8.6 to 8.9. The homogeneity of the chemical constituents and physical properties, as well as the turbidity and suspension of algae, indicated that the water in the reservoir was mixing because of autumn turnover.

During August 1980, the reservoir was stratified. A well mixed layer of water with almost constant temperature existed above an altitude of about 7,585 feet above sea level. The average depth below the lake surface of thickness of this zone was about 25 feet. Such a zone in a reservoir is defined as the epilimnion (Hutchinson, 1957, p. 427). A poorly mixed zone, or metalimnion, occurred in the reservoir at depths below the altitude of about 7,585 feet. The average thickness of the metalimnion was about 10 feet, and it was confined to the deeper parts of the reservoir. At the lower part of the metalimnion, below the altitude of about 7,577 feet, was a zone of water that was depleted of dissolved oxygen (anaerobic). The thickness of the anaerobic zone was about 2 feet.

Stratification in the reservoir also was evident for specific conductance and pH. Above an altitude of about 7,585 feet, the concentration of dissolved solids (as estimated from specific conductance) ranged from about 165 to 170 milligrams per liter; below an altitude of 7,585 feet, the concentration ranged from about 170 to 180 milligrams per liter. The pH ranged from about 8.5 to 8.9 above an altitude of 7,585 feet and from about 7.6 to 8.5 below 7,585 feet.

Dissolved and suspended nutrients were determined for 23 samples collected from the reservoir during 1979 and 1980. Dissolved and suspended nitrogen were separated into the inorganic and organic phases. Inorganic nitrogen includes nitrate, nitrite, and ammonia converted to an equivalent concentration of nitrogen as N.

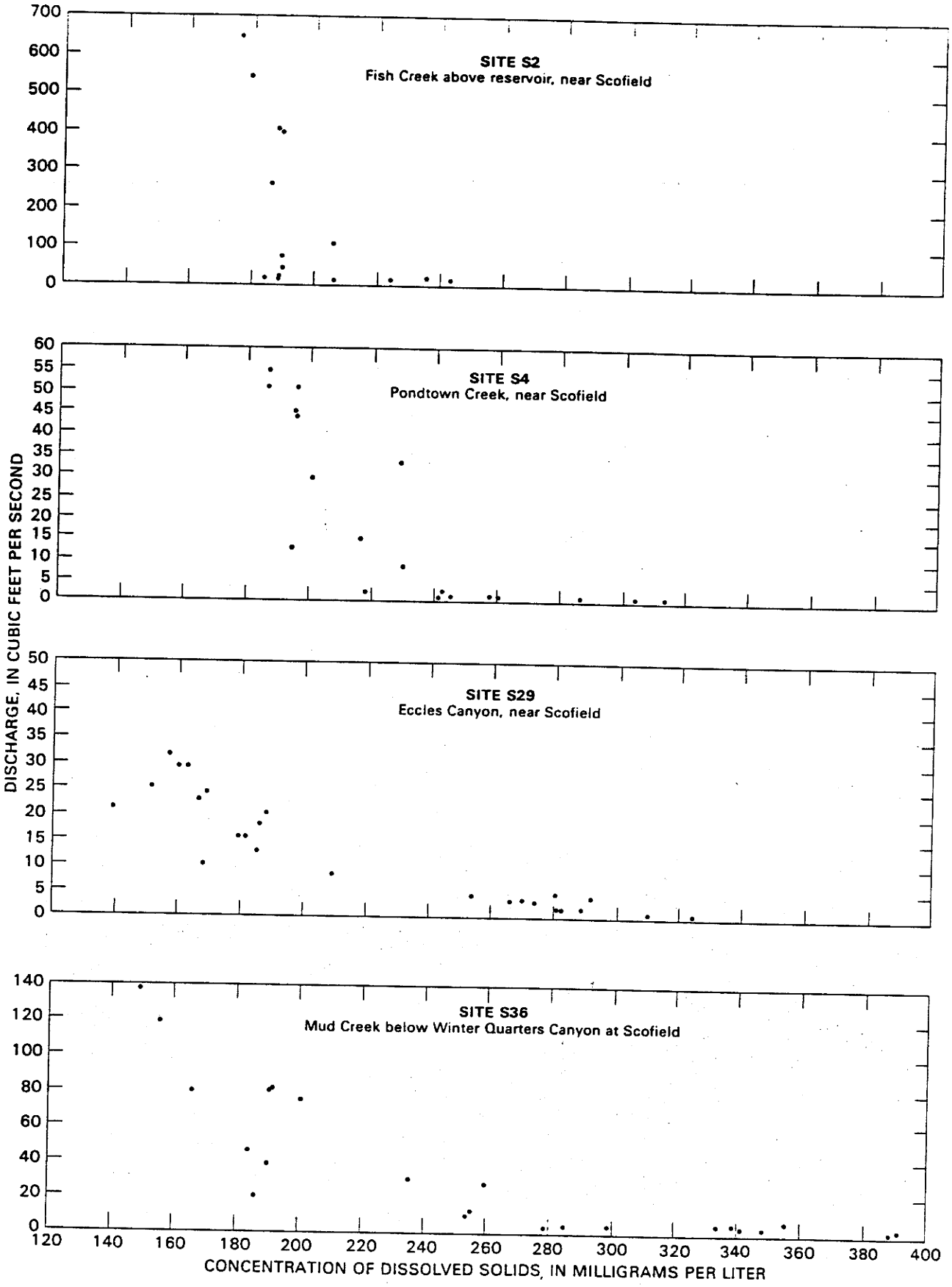


Figure 3. Relationship between the concentration of dissolved solids and discharge for selected streams in the Price River basin, 1980 water year.

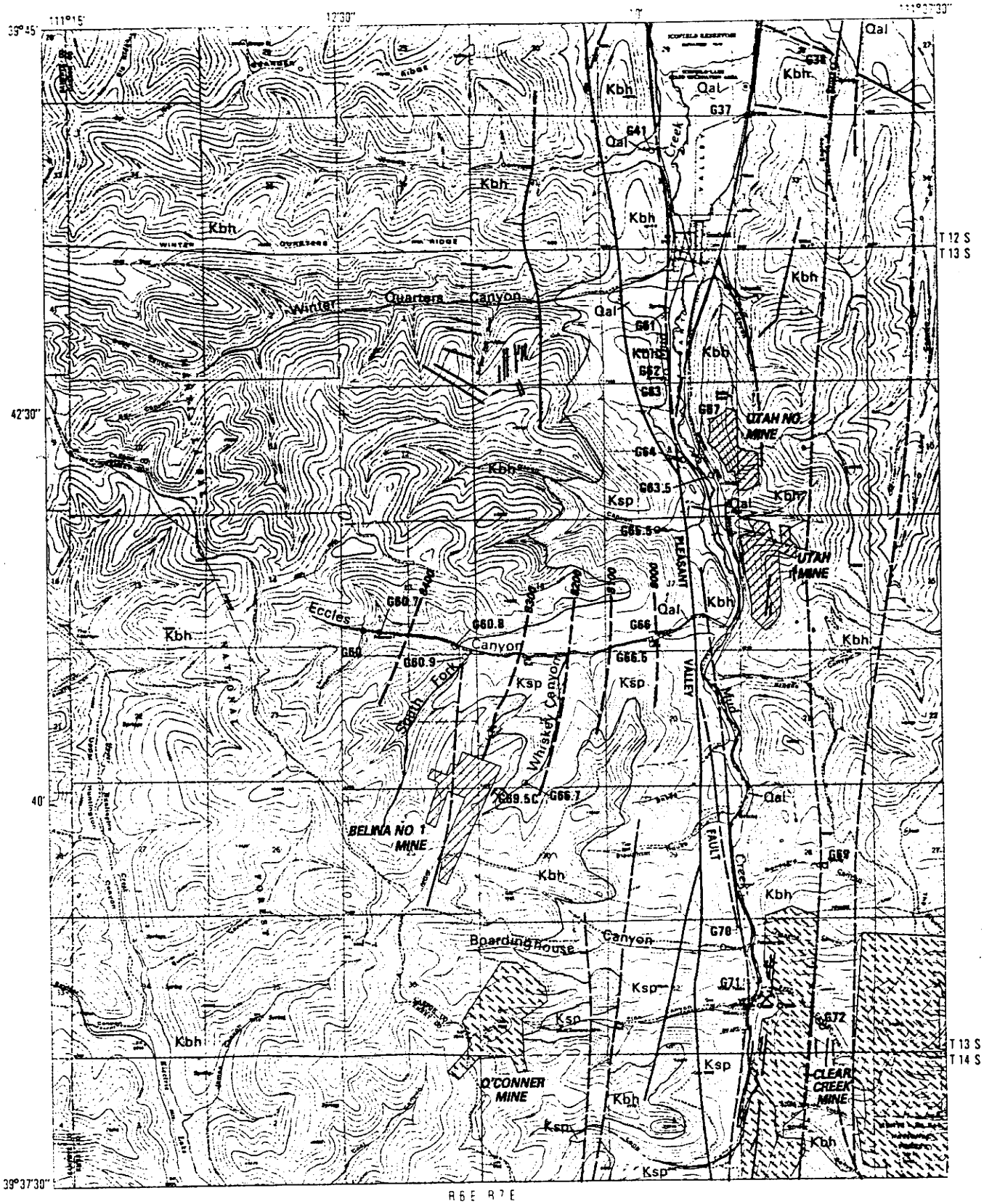
Table 4. Range of concentration of dissolved trace elements for selected streams, October 1, 1979–August 31, 1980
Site No.: See figure 1 for location. All concentrations in micrograms per liter.

Site No.	Stream		Arsenic	Boron	Copper	Iron	Lead	Mercury	Selenium	Zinc
S2	Fish Creek	Maximum	<1	30	<10	160	13	<0.1	<1	10
		Minimum	<1	<5	<1	10	<1	<.1	<1	<3
		Number of measurements	6	6	6	5	6	5	7	7
S4	Pondtown Creek	Maximum	<1	40	<10	450	21	<.1	<1	440
		Minimum	<1	6	<1	10	<1	<.1	<1	<3
		Number of measurements	8	8	7	7	7	6	8	8
S29	Eccles Canyon	Maximum	<1	40	9	50	5	<.1	<1	180
		Minimum	<1	<5	<1	10	<1	<.1	<1	<3
		Number of measurements	9	9	5	9	8	6	9	9
S36	Mud Creek	Maximum	2	60	<10	30	28	<.1	<1	10
		Minimum	<1	10	<1	10	<1	<.1	<1	<3
		Number of measurements	9	9	6	8	9	4	9	9
S37	Price River	Maximum	1	30	<10	20	19	<.1	<1	20
		Minimum	<1	4	<1	<10	<1	<.1	<1	<3
		Number of measurements	6	6	6	5	6	4	6	6
S59	Soldier Creek	Maximum	3	280	2	20	3	<.1	3	20
		Minimum	<1	40	<1	<10	<1	<.1	<1	<3
		Number of measurements	7	7	2	7	7	2	7	7
		Recommended maximum limits								
		Domestic water supply [1]								
			50	–	–	–	50	2.0	10	–
		Freshwater aquatic life [2]								
			50	–	([3])	1,000	([3])	.05	([3])	([3])

[1] U.S. Environmental Protection Agency, 1976, p. 5.
[2] U.S. Environmental Protection Agency, 1978, p. 14-245.
[3] Limit is dependent on type of aquatic species as well as other chemical constituents and physical properties of the water.

Most of the dissolved nitrogen was in the organic form. The maximum concentration of dissolved inorganic nitrogen during 1979 was 0.12 milligram per liter, and during 1980 the maximum was 0.47 milligram per liter as shown in the table below:

	Dissolved nitrogen as N (milligrams per liter)				Suspended nitrogen as N (milligrams per liter)			
	Inorganic (nitrate + nitrite + ammonia)		Organic		Inorganic (nitrate + nitrite + ammonia)		Organic	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1979	0.01	0.12	0.42	0.81	0.12	1.44	<0.01	1.37
1980	.05	.47	.38	.63	<.01	.01	<.01	3.62



Base from U.S. Geological Survey
Scofield, 1:24,000, 1979

R 6 E R 7 E

0 ½ 1 2 MILES

0 .5 1 2 KILOMETERS

CONTOUR INTERVAL 80 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology from Spieker, 1931 (Plate 31)

EXPLANATION

Qal — ALLUVIUM (QUATERNARY)

Kbh — BLACKHAWK FORMATION (CRETACEOUS)

Ksp — STAR POINT SANDSTONE (CRETACEOUS)

CONTACT

FAULT—Dashed where approximately located

ACTIVE COAL MINE

INACTIVE COAL MINE

HYDROLOGICAL DATA SITE AND NUMBER

G41 — SPRING

G66.7 — WELL

G69.5 — MINE PORTAL

8000 — APPROXIMATE POTENTIOMETRIC CONTOUR—Shows approximate altitude at which water would have stood in tightly cased wells completed in the Star Point Sandstone. Contour interval 100 feet. National Geodetic Vertical Datum of 1929

Figure 15. (above and facing page) Geology, data-collection sites for ground water, and potentiometric surface for the Star Point Sandstone in the Mud Creek drainage basin, 1980.

tributaries are indicated by the abrupt rise in the graph at the point of inflow. Seepage gains or losses are indicated by the rise or fall of the graph between measuring sites. Streamflow at all sites in Eccles Canyon and on Mud Creek was greater during September 1980 than during October 1979, but downstream trends generally were similiar.

During periods of low flow, water in Mud Creek is derived principally from Boardinghouse, Eccles and Winter Quarters Canyons, from an abandoned mine, and from seepage from the Star Point Sandstone and Blackhawk Formation. The loss of streamflow between sites S5 and S8 is believed to be due to seepage into abandoned tunnels of the Clear Creek Mine (fig. 2), which underlies parts of Mud Creek between sites S5 and S8. Between sites S8 and S11, however, discharge from the mine entered the stream. Discharge from the mine was 130 gallons per minute on October 12, 1979, and 265 gallons per minute on September 5, 1980. This contrasts with stream discharges immediately upstream from the mine at site S5 and S8 of about 18 gallons per minute or 0.04 cubic feet per second and 175 gallons per minute or 0.39 cubic feet per second, respectively.

Directly downstream from site S11, inflow from Boardinghouse Canyon also causes an increase of streamflow. Most of the inflow from Boardinghouse Canyon is contributed from Boardinghouse Spring (site G70, fig. 15), which is a large seepage area issuing from the Star Point Sandstone along the Pleasant Valley fault zone near the mouth of Boardinghouse Canyon. The discharge of the spring during October 1979 was 180 gallons per minute and during September 1980 it was 350 gallons per minute. Between sites S16 and S19, Mud Creek gained approximately 180 gallons per minute on October 13, 1979, and September 5, 1980. These gains represent discharge from the Star Point Sandstone along the Pleasant Valley fault.

Downstream from Eccles Canyon, measured gains and losses in streamflow were inconsistent in 1979 and 1980. The inconsistency may be due to measurement errors or to changes of storage in the alluvium. Although the thickness of the alluvial deposits is not known, the areal extent increases downstream from the mouth of Eccles Canyon (fig. 15). A 5- to 10-percent error is not uncommon for measurements made with pygmy current meters and for a discharge of 2,000 gallons per minute or 4.5 cubic feet per second, the error could be as much as 200 gallons per minute or 0.45 cubic feet per second.

The base flow of the stream in Eccles Canyon is derived principally from South Fork and seepage from the Star Point Sandstone. The largest and most consistent increase of flow in Eccles Canyon was in the reach between the inflow of South Fork and site S26.5. On October 12, 1979, the gain was 190 gallons per minute, and on September 5, 1980, it was 230 gallons per minute. The Star Point Sandstone is exposed in Eccles Canyon from near site S24 to almost the mouth of the canyon. The potentiometric surface in the Star Point Sandstone intercepts the floor of Eccles Canyon near the contact with the underlying Blackhawk Formation (fig. 17). A north-trending fault, which crosses Eccles Canyon at the junction with South Fork Canyon, may be the major source area for the gains between South Fork and site S26.5.

Whiskey Canyon, which conveys water discharged from the Belina No. 1 Mine, also contributes considerable quantities of inflow to Eccles Canyon; but the volume of mine discharge, as opposed to natural discharge, was not determined. On September 5, 1980, a gain of about 130 gallons per minute was measured between Whiskey Canyon and site S28.

Between sites S28 and S30, gains of about 200 gallons per minute were measured on September 5, 1980. Changes on October 12, 1979, could not be determined accurately because of unsteady flow from Whiskey Canyon. The increase in flow on September 5, 1980, was caused by seepage from a large area along the Pleasant Valley fault zone (fig. 18). Within an area about 500 feet upstream from site S30, the water level in a well in the Star Point Sandstone is within 2 to 3 feet of the land surface. There is considerable diffuse seepage, and spring G66 (Iron Spring) discharged 45 to 84 gallons per minute on October 11, 1979, and September 5, 1980.

The concentrations of sodium and sulfate ions were used in equation 4 to estimate Q_F. The sodium and sulfate ions are extremely soluble, and they are less likely to precipitate from solution in waters such as those occurring in the Soldier Creek area than are the calcium ions and carbonate. This is supported by evidence of deposition of calcium carbonate along Soldier Creek upstream from gaging station S59.

Average values for Q_F and Q_B were determined from two independent computations, using the concentrations of sodium and sulfate ions. As a check, the computations also were made using the concentration of dissolved solids, and the values were found to agree reasonably well with the values computed using sodium and sulfate.

For the computations of Q_F and Q_B to be valid, it is essential that no overland flow be included in the streamflow. The first computation was made using chemical-quality data from samples collected on May 22, 1980. At that time, the streamflow may have included a small component of overland flow. On June 5, 1980, there was no snowpack and overland flow was nil. Thus, computations of Q_B and Q_F probably are most valid beginning with the measurements made in June.

The computed values of Q_F and Q_B are shown in figure 13 for Coal, Soldier and Dugout Creeks. As the hydrographs indicate, the ground-water contribution is greatest during the early part of the recession period. The streamflow during the early part of the recession period consists mostly of Q_F; but by late summer or early fall, Q_F has receded more than Q_B. At Soldier and Coal Creeks, Q_B sustains the low flow through the fall. At Dugout Creek, Q_F is slightly greater than Q_B during the early fall and streamflow has almost ceased.

The estimated proportions of ground water and surface runoff from Coal, Soldier, and Dugout Creeks during the 1980 water year are shown in table 10. Ground-water discharge from the Flagstaff Limestone contributed about 4,400 acre-feet, or 41 percent of the combined streamflow of Coal, Soldier, and Dugout Creeks; discharge from the Blackhawk and other formations contributed about 2,200 acre-feet, or 21 percent of the streamflow.

DETECTING EFFECTS OF MINING ON THE HYDROLOGY

Several methods were used in this study to provide an understanding of the relationship between ground and surface water. Combinations of some of these methods can be used to determine if hydrologic changes that occur during mining are caused by interbasin diversions or by redistribution of flow along streams within a basin.

The drainage basin of Mud Creek currently (1981) is the most active mining area in the Wasatch Plateau. The possibility exists of diverting ground water from the Mud Creek basin into Huntington Creek by means of underground tunneling associated with mining activities.

Interbasin Diversions

If the low flow of a stream is affected by interbasin diversion of ground water, this can be determined by correlation with low flows of streams in adjacent basins where geology and climate are similar. Waddell and others (1981, fig. 10) correlated the low flows of several streams in the southern Wasatch Plateau. They found that with 5 years of continuous-discharge record, monthly flows during August, September, and October could be estimated with a standard error of 20 percent.

The length of the discharge records at Mud Creek and Eccles Canyon are too short to make correlations between monthly flows. The ratios of the monthly flows of Mud Creek (site S36) to Fish Creek (site S2) were computed to determine their agreement for 1979 and 1980. The ratios of monthly flows for October ranged from 0.39 to 0.45, for August the ratios ranged from 0.19 to 0.34, and for September they ranged from 0.22 to 0.38. Precipitation and streamflow were much greater during 1980 than during 1979, so the ratios provide some indication of how good the correlation is for variable climatic conditions.

The volume of water that would have to be diverted from the Mud Creek basin before it could be detected can be approximated by assuming that the standard error of estimate is similar to that obtained by Waddell and others (1981, p. 13), and by using the average flow ratio of 0.42 between Mud and Fish Creeks for October. Using (1) a standard error of 20 percent, (2) an average flow at Fish Creek at site S2 during October of 330 acre-feet, and (3) the ratio of flow in Mud Creek to Fish Creek of 0.42, then the standard error of estimate of the flow in October in Mud Creek would be $(\pm 0.20)(330)(0.42) = \pm 28$ acre-feet (or an average flow of ± 0.45 cubic foot per second). If the diverted volume were equal to 0.45 cubic foot per second, it would be detectable two-thirds of the time by using the correlation between the flows of Mud and Fish Creek.

In the Book Cliffs, it is not likely that water will be diverted out of the Price River basin, but diversions may occur within subbasins. The lengths of the discharge records at Coal, Soldier, Dugout, Grassy Trail, and Horse Canyon Creeks are too short to make correlations between monthly flows. The records at these stations were correlated with the long-term record at Willow Creek (site S37.3). The computed ratios indicate that correlation with Willow Creek may be poor, probably due to thunderstorms in late August and September, which are generally localized and of variable intensity.

Redistribution of Flow

Mining activities may affect the distribution of flow along stream reaches by direct interception of water from a stream or by interception of ground water that is percolating to the stream. In several of the potential coal-development areas, including the Mud and Soldier Creek drainages, gaging stations are operated downstream from the existing or potential coal-mining areas. In addition, seepage-study sites extend from upstream of the coal-mining areas to the gages. Correlation ratios for flows at seepage-study sites and at gaging stations may prove useful on some streams for detecting changes in the distribution of flow along stream reaches.

Ratios were computed between the gaged flow and the base flows at sites upstream and downstream from existing or potential coal-mining areas for the Mud and Soldier Creek drainages. The ratios, which were computed for seepage studies made in 1979 and 1980, are shown in figures 22, 23, and 24.

The ratios for flows along Mud Creek were fairly uniform in the upstream reaches but varied considerably in the downstream reaches (fig. 22). The maximum range in ratios at sites upstream from Boardinghouse Canyon was 16 percent for as many as four measurements made during August, September, and October in 1979 and 1980. Downstream from Boardinghouse Canyon, the range was 32 percent. By eliminating the August 1980 measurement, the maximum range in ratios for all sites on Mud Creek is decreased to about 20 percent. Considering that the distribution of flow along Mud Creek has been affected by past mining and that the base flows are comprised of inflow from both the Blackhawk Formation and the Star Point Sandstone, the ratios are within a small enough range to provide a means of detecting changes caused by future mining activities. Future monitoring probably needs to be confined to the base-flow period of September and October.

The ratios computed for Eccles Canyon were consistent during 1979 and 1980 (fig. 23) despite the large difference in the quantity of base flow during the 2 years (fig. 16). The maximum difference was about 12 percent of the gaged flow at site S29. This indicates that the distribution of flow along the stream is not affected by considerable differences in total ground-water discharge to the streams. This is probably because most of the base flow of Eccles Canyon during the fall is maintained by ground water from only one aquifer—the Star Point Sandstone. Changes in the ratios that might be caused by future mining activities would be due to changes in recharge or discharge to the Star Point Sandstone. Thus, if tunneling in the Blackhawk Formation in the upper part of Eccles Canyon intercepts recharge that would have percolated to the Star Point Sandstone, it probably would cause the ratio to increase in the upper part of Eccles Canyon and decrease in the lower part of the canyon.

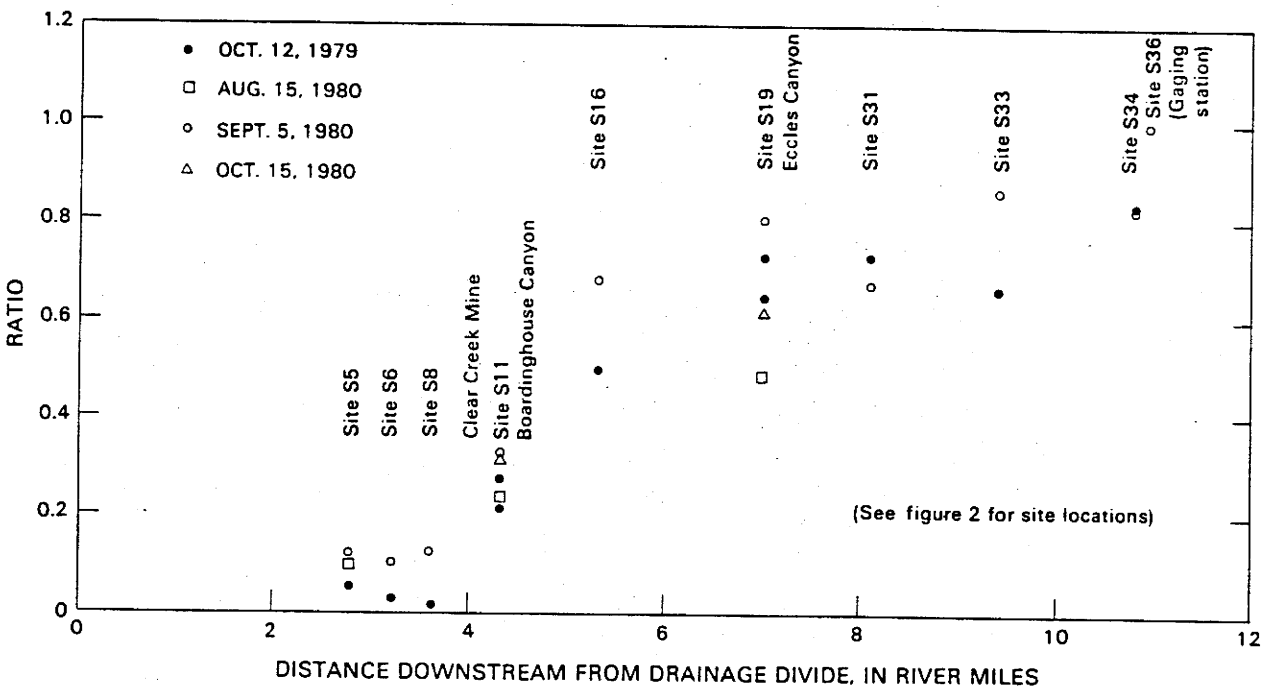


Figure 22. Ratio of discharge at selected sites to discharge at mouth of Mud Creek (site S36) on October 12, 1979, August 15, 1980, September 15, 1980, and October 15, 1980.

The ratios computed for Soldier Creek (fig. 24) are affected by the volume of water being contributed by the Flagstaff Limestone relative to the contributions of underlying formations. Downstream from site S39, the ratios during August are smaller than the September ratios, and the ratios during September mostly are smaller than the ratios during October. Downstream from site S39, the base flow is a mixture of water from the Flagstaff and underlying formations. As discussed in the section on "Discharge to streams," the proportion of water contributed by the Flagstaff at the gaged site (S59) is much smaller during the fall than during the summer after snowmelt, whereas the seasonal change in the volume of ground water contributed by the Blackhawk and other formations is comparatively small. Thus, to decrease the variability of the ratios, measurements need to be made during late September or in October when the contribution from the Flagstaff Limestone is small. The use of ratios based on measurements made during September and October would not be effective in detecting changes in the contribution from the Flagstaff, however, because only a small volume of water is contributed by the Flagstaff during September and October.

ADDITIONAL STUDIES

1. In order to detect the effects of interbasin diversion of ground water and redistribution of streamflow, monitoring needs to include continuous gaging of streamflow at sites directly downstream from coal-mining areas in conjunction with seepage studies in the stream reaches upstream from the gaged sites. The seepage studies need to be made during September or October. Prior to making seepage studies, gage-height charts need to be examined to determine if streamflow conditions have been affected by recent precipitation. The monthly flow of Mud Creek needs to be correlated with that of Fish Creek in order to detect possible effects of interbasin diversions.
2. The major dissolved inorganic ions need to be monitored during the recession period following snowmelt at Coal, Soldier, and Dugout Creeks. Monthly sampling needs to begin after the snowpack is gone and continue until September or October. The data obtained need to be studied to determine if ground-water contributions from the Flagstaff Limestone and Blackhawk Formation have changed as a result of mining activities.
3. The natural discharge areas of aquifers upstream and downstream from mines need to be monitored by seepage studies in streams. In addition, the flow of major springs needs to be measured at least twice monthly beginning with the snowmelt period and continuing through October so that recession characteristics can be determined.
4. The hydraulic characteristics of the Star Point Sandstone and the Blackhawk Formation need to be defined in Eccles Canyon by means of aquifer tests at existing wells completed in the Star Point and new wells to be completed in the Blackhawk.
5. In order to define the direction of ground-water movement in the Wasatch Plateau, hydraulic-head

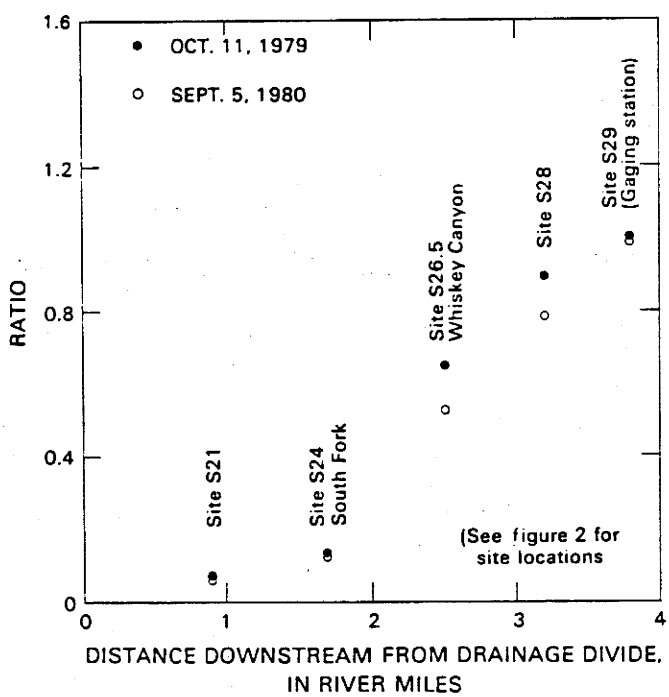


Figure 23. Ratio of discharge at selected sites to discharge at mouth of Eccles Canyon (site S29) on October 11, 1979, and September 5, 1980.

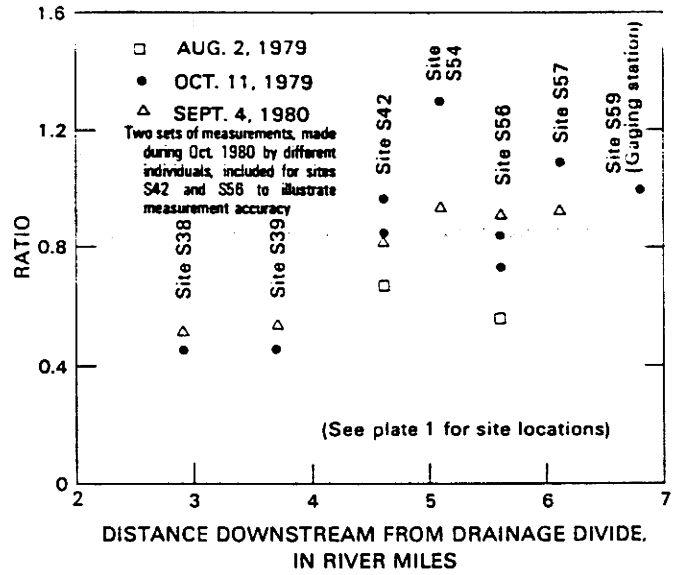


Figure 24. Ratio of discharge at selected sites to discharge at mouth of Soldier Creek (site S59) on August 2, 1979, October 11, 1979, and September 4, 1980.

differences with depth need to be determined in the recharge and discharge areas of Eccles Canyon as well as in all basins where there is or will be mining. In the Book Cliffs, hydraulic-head differences with depth need to be defined near the face of the cliffs and at sites some distance into the cliffs; zones in the Flagstaff Limestone, North Horn, and Price River Formations, Castlegate Sandstone, and Blackhawk Formation need to be included. Additional information about the direction of ground-water movement in the Book Cliffs could be obtained by determining the redox potential of water using selected phases of nitrogen, pH, and trace metals, and the concentrations of sulfide and sulfate in water from spring G89, wells G84.5 and G58.5, and from mines at sites G98.5 and G99.7.

6. Sediment concentration needs to be monitored in Eccles Canyon. Data collection needs to include thunderstorm runoff as well as snowmelt runoff, and sufficient data need to be collected so that total sediment loads can be computed.
7. In order to detect the possibility of increasing productivity of algae and other plants in Scofield Reservoir, nutrients need to be monitored in Mud Creek and in the outflow from the reservoir.

SUMMARY

1. The flow of Fish Creek in the Wasatch Plateau was about 97 percent of the average for the 1971-80 water years during 1979 and about 170 percent of the average during 1980. Willow Creek in the Book Cliffs was about 250 percent of the average for the 1971-80 water years during 1979 and about 196 percent of the 1971-80 average during 1980.
2. Estimated annual evapotranspiration during the 1971-80 water years in four basins in the Wasatch Plateau and Book Cliffs ranged from 16 to 21 inches and averaged 19 inches.
3. During the 1980 water year, the concentration of dissolved solids at the gage on Mud Creek in the Wasatch Plateau ranged from 150 milligrams per liter during high flow to 390 milligrams per liter during low flow, and the discharge-weighted average was 216 milligrams per liter. The principal chemical constituents were calcium and bicarbonate during all flows. Eccles Canyon is a major contributor of nutrients to Mud Creek, and most of the nutrient load occurs in the form of suspended organics. During the snowmelt period, total nitrogen and phosphorus were as great as 21 and 4.3 milligrams per liter at the gaging station in Eccles Canyon.
4. During the 1980 water year, the concentration of dissolved solids in Soldier Creek at the gaging station in the Book Cliffs ranged from 277 milligrams per liter during high flow to 696 milligrams per liter during low flow. The principal chemical constituents in the high flows following snowmelt are calcium and bicarbonate, whereas in the low flows they are sodium, magnesium, sulfate, and bicarbonate. Streamflow after snowmelt consists principally of ground water from the Flagstaff Limestone, whereas during the late summer and fall the streamflow generally consists of relatively greater proportions of ground water from the Blackhawk and other formations. Coal and Dugout Creeks have water-quality characteristics similar to that of Soldier Creek.
5. During the early fall of 1979 Scofield Reservoir was almost completely mixed due to the autumn turnover. In August 1980, however, the reservoir was stratified and an anaerobic zone had developed in the deeper part of the reservoir.
6. Most of the deposition of coal in Scofield Reservoir occurred prior to about 1950. The concentrations of trace metals such as iron, manganese, lead, and zinc are enriched near the surface of the bottom sediments, but the enrichment is not as pronounced for the other metals, including arsenic and mercury.
7. Deposition of sediment in Scofield Reservoir during 1943-79, as determined from bathymetric surveys, was computed to be 3,000 acre-feet. The average sediment yield of the associated drainage basin, as determined from bathymetric surveys and dating with radioisotopes, ranged from 0.2 to 0.5 acre-foot per square mile per year.
8. Much of the ground-water discharge from the Star Point Sandstone and the Mesaverde Group in the Wasatch Plateau occurs along faults. In the Book Cliffs, where faulting is less extensive, most of the ground-water discharge is from the Flagstaff Limestone. The Flagstaff has great diffusivity, has a small storage coefficient, and contains water which is perched.
9. Springs issuing from the Star Point Sandstone in the Mud Creek drainage basin typically had recession indexes greater than 365 days per log cycle. Springs issuing at the higher altitudes from the Colton Formation and the Flagstaff Limestone in the Soldier Creek area, have greater seasonal variability, with recession indexes ranging from 24 to 115 days per log cycle.
10. During 1980, the total reported and measured mine discharge in the study area was 2,800 acre-feet.
11. In the Book Cliffs, recession characteristics of streamflow may have some use in monitoring possible changes in recharge to and discharge from the Flagstaff Limestone. Subsidence could cause a change in the recharge-discharge relationships.
12. In most of the Wasatch Plateau, the concentration of dissolved solids in ground water was less than

500 milligrams per liter, and the principal chemical constituents were calcium and bicarbonate. In the Book Cliffs, the concentration of dissolved solids in water in the Flagstaff Limestone ranged from 250 to 500 milligrams per liter, whereas in water from the Blackhawk and North Horn Formations, the concentration ranged from 500 to more than 1,000 milligrams per liter. The principal chemical constituents in water from the Flagstaff Limestone were calcium and bicarbonate, but water from the Blackhawk was of variable chemical composition, generally of a mixed type with no dominant cation or anion. In areas of the Book Cliffs where the Mancos Shale is affecting the quality of water in the Blackhawk Formation, sodium and sulfate ions generally dominate the chemical composition. Most ground water in the study area is almost saturated with respect to calcite.

13. The top of the saturated zone in the Blackhawk Formation in the upper part of Eccles Canyon generally is above the coal zones, and dewatering will be required in most places during mining.
14. In Eccles Canyon in the Wasatch Plateau seepage from the Star Point Sandstone is the major contributor to base flow. During the fall of 1980, gains of as much as 230 gallons per minute occurred near a fault zone which crosses Eccles Canyon at the junction with South Fork Canyon.
15. Prior mining has caused redistribution of flow in the upper Mud Creek drainage basin. Water from Mud Creek that is intercepted by the abandoned Clear Creek Mine is discharged back to Mud Creek downstream from the mine.
16. During the 1980 water year, the estimated annual discharge from the major springs and mines issuing from the Blackhawk Formation and Star Point Sandstone in the Mud Creek drainage basin was 1,340 acre-feet.
17. Estimated tranmissivities in the Soldier Creek area ranged from 0.07 foot squared per day in the Price River Formation to 0.003 foot squared per day in a lower zone of the Castlegate Sandstone.
18. In both the Mud Creek drainage basin and the Soldier Creek area, the coal-bearing zones of the Blackhawk Formation are saturated with water, and in most places dewatering will be required during mining.

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SELECTED HYDROLOGIC DATA
PRICE RIVER BASIN UTAH
WATER YEARS 1979 AND 1980
U.S. GEOLOGICAL SURVEY, 1982

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SELECTED HYDROLOGIC DATA, PRICE RIVER BASIN, UTAH, WATER YEARS 1979 AND 1980

by K. M. Waddell, J. E. Dodge, D. W. Darby, and S. M. Theobald

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U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 82-916

Prepared in cooperation with the

U.S. BUREAU OF LAND MANAGEMENT

Salt Lake City, Utah
1982

Table 10.--Discharge and specific conductance of water at seepage study sites

Specific conductance: Field measurements.

Stream	Site No. (see pl.1)	Date	Discharge (ft^3/s)	Specific conductance (µmho/cm at 25°C)
		Mud Creek drainage basin		
Mud Creek	5	10-12-79	0.11	385
		9-05-80	.45	400
	6	10-12-79	.05	380
		9-05-80	.34	--
Long Canyon	7	10-12-79	.01	350
		9- 5-80	.03	400
Mud Creek	8	10-12-79	.04	385
		9- 5-80	.39	405
Finn Canyon	9	10-12-79	.02	520
		9- 5-80	.04	540
Mine inflow	10	10-12-79	.29	650
		9- 5-80	.59	690
Barn Canyon	10.5	10-12-79	0	--
		9- 5-80	.05	480
Mud Creek	11	10-12-79	.42	620
		9- 5-80	.98	580
Boardinghouse Canyon	13	10-12-79	.53	465
		9- 5-80	1.2	495
Mud Creek	14	10-12-79	.02	530
		9- 5-80	.01	620
Slaughter House Canyon	15	10-12-79	0	--
		9- 5-80	.02	530
Mud Creek	16	10-12-79	.99	--
		9- 5-80	2.0	530
Broads Canyon	17	10-12-79	0	--
		9- 5-80	.01	550
Mud Creek	19	10-12-79	1.4	500
		9- 5-80	2.4	520
Eccles Canyon	20	10-11-79	.08	445
		9- 5-80	.12	445
	21	10-11-79	.08	430
		9- 5-80	([1])	--
Unnamed	22	10-11-79	.04	405
		9- 5-80	([1])	--
	23	10-11-79	.03	500
		9- 5-80	([1])	--
Eccles Canyon	24	10-11-79	.14	390
		9- 5-80	.31	470
South Fork Canyon	25	10-11-79	.11	375
		9- 5-80	.28	395
Eccles Canyon	26.5	10-11-79	.67	465
		9- 5-80	1.1	485

SURFACE WATER SITES
U.S. GEOLOGICAL SURVEY
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Table 10.--Discharge and specific conductance of water at seepage study sites--Continued

Stream	Site No. (see pl. 1)	Date	Discharge (ft^3/s)	Specific conductance (µmho/cm at 25°C)
		Mud Creek basin--Continued		
Whiskey Canyon	27	10-11-79	0.53	--
		9- 5-80	.25	--
Eccles Canyon	28	10-11-79	.93	320
		9- 5-80	1.7	495
	30	10-11-79	1.0	475
		9- 5-80	2.1	490
Mud Creek	31	10-12-79	2.5	495
		9- 5-80	4.1	510
Green Canyon	32	10-12-79	.02	490
		9- 5-80	0	--
Mud Creek	33	10-12-79	2.4	--
		9- 5-80	4.7	500
	34	10-12-79	2.7	500
		9- 5-80	4.6	475
Winter Quarters Canyon	35	10-12-79	.30	580
		9- 5-80	.51	600
		Soldier Creek drainage basin		
Soldier Creek	38	10-10-79	.20	880
		9- 4-80	.57	910
	39	10-10-79	.20	800
		9- 4-80	.61	870
Unnamed	40	10-10-79	.18	830
		9- 4-80	.27	720
	41	10-10-79	.01	700
		9- 5-80	.04	610
Soldier Creek	42	10-10-79	.43	830
		9- 5-80	.92	800
Pine Canyon	43	10-10-79	.02	590
		9- 4-80	.03	580
	44	10-10-79	.01	540
		9- 4-80	.04	480
Unnamed	45	10-10-79	.02	530
		9- 4-80	.03	510
Pine Canyon	46	10-10-79	.02	530
		9- 4-80	.05	435
		10-11-80	.07	500

U.S. GEOLOGICAL SURVEY
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Site No.: See plate 1.
Specific conductance: Field measurements.
pH: Field measurements.

Table 11.--Inorganic chemical analyses of major ions

Stream	Site No.	Date of sample	Temperature (°C)	Discharge (ft^3/s)	Specific conductance (µmhos/cm at 25°C)	pH (units)	Dissolved solids, sum of constituents	Dissolved silica (as SiO_2)	Dissolved calcium (as Ca)	Dissolved magnesium (as Mg)	Dissolved sodium (as Na)
							Milligrams				
Gooseberry Creek	1	7-20-79	20.0	9.3	265	7.8	148	2.2	39	11	1.9
		7-30-80	21.5	9.2	210	-	95	1.2	21	9.1	.8
Fish Creek	2	11-16-78	.0	10	540	-	-	-	-	-	-
		4- 3-79	.0	7.8	420	-	-	-	-	-	-
		5-18-79	3.5	393	300	-	-	-	-	-	-
		6-12-79	18.0	131	360	-	-	-	-	-	-
		7-18-79	19.5	22	335	8.3	191	4.7	55	12	2.9
		8-16-79	10.5	15	330	-	-	-	-	-	-
		9-19-79	13.0	8.0	320	-	-	-	-	-	-
		10-18-79	8.0	8.0	300	-	-	-	-	-	-
		11-15-79	1.0	10	360	-	202	4.6	57	14	2.4
		12-13-79	.0	12	415	-	-	-	-	-	-
		2- 6-80	.0	10	390	-	-	-	-	-	-
		2-21-80	3.5	9.6	425	-	-	-	-	-	-
		4-24-80	7.0	84	330	-	-	-	-	-	-
		5-28-80	6.0	413	330	-	189	4.6	60	9.2	1.9
		5-29-80	11.0	468	300	-	-	-	-	-	-
		6-19-80	12.5	227	330	-	-	-	-	-	-
		7-15-80	18.5	39	330	-	189	4.1	52	12	2.5
		8-14-80	18.0	18	310	-	-	-	-	-	-
		8-20-80	8.5	14	330	-	192	4.6	49	12	2.6
		10- 8-80	14.0	12	300	-	-	-	-	-	-
Pondtown Creek	3	7-18-79	14.5	1.4	420	8.2	246	5.8	66	13	3.9
	4	7-18-79	20.0	1.3	415	8.3	244	6.1	68	13	4.3
		11-15-79	2.5	.64	550	-	347	6.7	94	18	6.1
		12-13-79	.0	.72	530	-	-	-	-	-	-
		2- 6-80	.0	.91	440	-	-	-	-	-	-
		4-24-80	.5	13	320	-	190	5.0	56	9.1	3.2
		5- 7-80	-	45	305	-	177	5.1	53	7.6	2.6
		5-27-80	8.0	52	345	-	200	5.5	63	8.7	2.6
		7-15-80	19.5	3.2	425	-	251	5.6	70	13	4.0
		8-20-80	14.0	.14	430	-	246	5.5	67	13	4.4
Mud Creek	5	7-17-79	13.0	2.1	295	8.2	159	3.7	43	10	1.9
		7-30-80	12.0	.83	330	-	190	4.2	52	12	2.2
		9- 5-80	6.0	.45	405	-	233	5.1	61	16	3.1
	8	9- 5-80	6.5	.39	415	-	231	4.9	60	16	2.8
	11	9- 5-80	7.0	.98	580	-	346	6.6	81	27	4.9
	13	9- 5-80	7.5	1.2	500	-	286	5.9	70	24	3.3
	16	9- 5-80	5.5	2.0	530	-	301	6.3	74	25	4.4
	18	7-17-79	15.0	2.8	465	8.1	262	5.2	63	19	4.2
		7-30-80	17.5	3.4	460	-	236	5.6	67	21	4.0
	19	9- 5-80	6.0	2.4	530	-	306	6.4	71	26	5.0
Eccles Canyon	20	7-17-79	13.0	-	455	8.3	258	5.8	75	13	3.5
		7-29-80	10.0	.26	430	-	236	4.7	73	13	2.8
		9- 5-80	10.0	.12	480	-	257	6.4	72	14	3.2
	24	9- 5-80	10.0	.31	550	-	271	6.9	72	19	4.3
	26.5	9- 5-80	11.0	1.1	520	-	268	6.4	67	20	3.3
	29	7-17-79	14.0	2.7	460	8.3	275	6.2	67	21	3.5
		10-12-79	7.0	.96	510	8.5	364	6.2	81	29	3.7
		11- 9-79	3.0	.95	550	8.0	330	6.3	79	27	4.1
		12-12-79	1.0	1.0	560	8.1	312	7.0	79	27	4.8
		1-15-80	3.0	1.0	520	8.0	302	6.5	74	24	3.5
		2- 5-80	2.0	1.0	550	8.2	322	6.8	77	28	3.5
		3- 4-80	3.0	.82	570	8.0	325	6.8	73	25	9.0
		4- 8-80	3.0	1.0	560	8.1	343	7.4	77	26	5.7
		4-23-80	4.5	4.0	460	-	280	7.0	71	19	6.9
		5- 8-80	4.5	16	315	-	180	5.3	50	11	2.8
		5-21-80	5.0	21	330	8.3	189	5.5	50	11	2.6
		5-22-80	-	29	285	-	161	5.1	43	9.4	2.7
		6-26-80	12.0	8.3	365	8.6	209	5.7	57	13	2.5
		7-10-80	11.5	4.0	430	8.6	253	5.5	62	17	3.0
		7-16-80	14.5	2.9	465	-	271	5.8	68	19	9.5
		8-15-80	12.0	1.7	500	8.5	269	6.7	67	22	3.8
		8-18-80	12.0	1.3	490	-	283	10	69	24	4.0
		9-19-80	10.0	2.2	510	7.9	288	7.0	69	26	4.0
Mud Creek	30	9- 5-80	10.5	2.2	495	-	280	6.6	64	25	4.4
	31	9- 5-80	6.0	4.2	520	-	298	6.5	68	26	4.9
	33	9- 5-80	7.0	4.7	510	-	286	6.4	66	26	4.8
	34	7-17-79	18.5	3.6	475	8.2	273	6.6	67	21	4.7
		9- 5-80	8.0	4.6	485	-	281	6.0	61	25	5.0
	35	10-17-78	9.5	2.7	520	8.5	310	6.4	72	26	5.8
		11-14-78	-	4.9	590	8.4	329	6.6	76	26	6.5
		12- 9-78	.0	3.4	620	8.3	357	7.1	86	28	6.2
	36	1-17-79	.0	3.1	580	8.3	330	7.3	77	25	5.7
		2-20-79	.0	3.0	600	8.1	342	7.7	84	26	5.3

SITES 20-29 - SURFACE WATER SITE PLATE 30
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and trace metals in water from selected stream sites

per liter					Micrograms per liter							
Dissolved potassium (as K)	Alkalinity (as $CaCO_3$)	Dissolved sulfate (as SO4)	Dissolved chloride (as Cl)	Dissolved fluoride (as F)	Dissolved arsenic (as As)	Dissolved boron (as B)	Dissolved copper (as Cu)	Dissolved iron (as Fe)	Dissolved lead (as Pb)	Dissolved mercury (as Hg)	Dissolved selenium (as Se)	Dissolved zinc (as Zn)
0.1	133	11	1.6	0.1	1	10	-	0	0	0.0	0	<3
.2	92	5.5	1.3	.1	-	0	-	40	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
.6	160	15	2.9	.2	-	10	-	160	-	.0	0	10
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
.8	170	17	3.4	.1	1	10	1	20	3	-	0	<3
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	0	20	<10	-	13	-	0	4
-	-	-	-	-	0	-	2	-	2	.0	0	10
.6	170	5.8	2.2	.1	1	30	3	10	0	.0	0	<3
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-
.7	170	11	2.5	1.3	1	30	1	20	0	.0	0	<3
-	-	-	-	-	-	-	-	-	-	-	-	-
.8	160	23	3.9	.1	1	0	0	30	0	.0	0	<3
-	-	-	-	-	-	-	-	-	-	-	-	-
2.2	217	18	5.2	.3	1	20	-	420	45	.0	0	10
1.2	208	19	6.1	.2	1	30	-	450	-	.0	0	10
1.4	260	55	8.7	.1	0	20	0	10	12	-	0	4
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	0	20	<10	-	21	-	0	<3
1.0	150	18	5.5	.3	0	30	1	10	3	.0	0	<3
1.0	150	11	3.5	.1	1	6	2	20	1	.0	0	<3
.7	170	9.6	4.8	.1	1	20	4	20	0	.0	0	4
1.2	220	18	6.1	.3	1	40	1	40	0	.0	0	440
1.1	210	21	7.9	.2	1	8	0	10	0	.0	0	<3
.6	139	14	2.0	.1	0	20	-	0	79	.0	0	9
.6	170	14	2.5	.1	-	20	-	20	-	-	-	-
.7	200	23	3.4	.1	-	-	-	-	-	-	-	-
.9	200	22	3.8	.2	-	-	-	-	-	-	-	-
2.2	270	56	5.5	.2	-	-	-	-	-	-	-	-
1.6	240	33	3.9	.2	-	-	-	-	-	-	-	-
1.8	230	45	5.9	.2	-	-	-	-	-	-	-	-
1.7	212	35	5.9	.2	1	40	-	20	-	.0	0	30
1.6	160	34	6.0	.1	-	30	-	10	-	-	-	-
2.1	240	44	7.0	.2	-	-	-	-	-	-	-	-
1.1	-	18	3.2	.2	1	20	-	10	45	.0	0	10
1.0	200	13	3.1	.2	-	30	-	40	-	-	-	-
1.3	230	14	3.1	.2	-	-	-	-	-	-	-	-
1.8	230	22	4.5	.2	-	-	-	-	-	-	-	-
2.0	230	27	4.2	.2	-	-	-	-	-	-	-	-
1.7	230	32	4.5	.1	0	30	-	10	-	.0	0	10
2.6	240	94	4.6	-	-	-	-	-	-	-	-	-
2.2	270	44	4.5	-	-	-	-	-	-	-	-	-
2.4	240	43	4.5	.2	1	30	-	10	0	-	0	5
2.3	250	39	4.7	-	-	-	-	-	-	-	-	-
2.3	260	42	4.8	-	-	-	-	-	-	-	-	-
2.1	250	40	15	.2	1	30	-	<10	0	-	0	<3
2.3	280	45	12	-	-	-	-	-	-	-	-	-
2.1	200	35	15	.2	0	40	9	50	5	.0	0	10
1.3	140	16	3.9	.1	0	8	4	40	1	.0	0	<3
1.3	170	16	3.8	-	-	-	-	-	-	-	-	-
1.3	130	13	3.2	.2	1	30	6	30	0	.0	0	4
1.1	179	19	2.0	.1	1	0	-	20	2	-	0	<3
1.6	210	33	4.6	-	-	-	-	-	-	-	-	-
1.8	220	25	7.9	.3	1	40	2	30	0	.0	0	20
2.1	240	37	10	-	-	-	-	-	-	-	-	-
1.9	220	36	5.5	.2	0	20	0	<10	0	.0	0	180
2.7	300	41	6.5	-	-	-	-	-	-	-	-	-
2.1	220	39	5.8	.2	-	-	-	-	-	-	-	-
2.1	230	44	7.1	.2	-	-	-	-	-	-	-	-
2.1	220	42	6.6	.2	-	-	-	-	-	-	-	-
2.1	-	32	6.2	.2	1	40	-	40	-	.0	0	10
2.4	220	-	7.6	.2	-	-	-	-	-	-	-	-
2.7	232	50	7.6	-	-	-	-	-	-	-	-	-
2.8	245	56	8.7	-	-	-	-	-	-	-	-	-
2.8	271	55	8.2	.2	0	60	-	10	30	-	1	10
2.4	254	52	7.5	-	-	-	-	-	-	-	-	-
2.2	250	55	9.0	-	-	-	-	-	-	-	-	-

Site No: See plate 1.
Specific conductance: Field measurements.
pH: Field measurements.

Stream	Site No.	Date of sample	Specific conductance (µmhos/cm at 25°C)	pH (units)	Dissolved solids, sum of constituents	Nitrogen, $NO_2 + NO_3$ (as N) Dissolved	Nitrogen, $NO_2 + NO_3$ (as N) Total	Nitrogen, nitrate (as N) Dissolved	Nitrogen, nitrate (as N) Total
Gooseberry Creek	1	7-20-79	265	7.8	148	0.19	-	-	-
		7-30-80	210	-	95	.00	0.00	0.00	0.00
Fish Creek	2	7-18-79	335	8.3	191	.11	-	-	-
		11-15-79	360	-	202	.03	.03	.03	.03
		12-13-79	405	-	-	.17	.19	.16	.17
		2-21-80	425	-	-	.22	.28	.21	.27
		4-24-80	330	-	-	.32	.32	.29	.31
		5-28-80	330	-	189	.46	.46	.46	.46
		7-15-80	330	-	189	.05	.05	.04	.04
		8-20-80	330	-	192	.00	.00	.00	.00
		10- 8-80	300	-	-	-	-	-	-
Pondtown Creek	3	7-18-79	420	8.2	246	.10	-	-	-
		7-29-80	420	-	-	.00	.00	.00	.00
	4	7-18-79	415	8.3	244	.09	-	-	-
		11-15-79	550	-	347	.05	.05	.04	.00
		12-13-79	530	-	-	-	.06	-	.04
		2- 6-80	440	-	-	.11	.12	.11	.11
		4-24-80	320	-	190	.46	.46	.43	.46
		5- 7-80	305	-	177	.73	.73	.72	.73
		5-27-80	345	-	200	.52	.52	.51	.51
		7-15-80	425	-	251	.01	.05	.01	.04
		8-20-80	430	-	246	.00	.00	.00	.00
Mud Creek	5	7-17-79	295	8.2	159	.01	-	-	-
		7-30-80	330	-	190	.00	.00	.00	.00
		9- 5-80	405	-	233	.00	-	-	-
	8	9- 5-80	415	-	231	.00	-	-	-
	11	9- 5-80	580	-	346	.03	-	-	-
	13	9- 5-80	500	-	286	.00	-	-	-
	16	9- 5-80	530	-	301	.00	-	-	-
	18	7-17-79	465	8.1	262	.02	-	-	-
		7-30-80	460	-	236	.00	.00	.00	.00
	19	9- 5-80	530	-	306	.00	-	-	-
Eccles Canyon	20	7-17-79	455	8.2	258	.98	-	-	-
		7-29-80	430	-	236	1.1	1.0	1.1	1.1
	24	9- 5-80	550	-	271	.49	-	-	-
	26	9- 5-80	520	-	268	.00	-	-	-
	29	7-17-79	460	8.3	275	.02	-	-	-
		12-12-79	560	8.1	312	.14	-	.14	-
		3- 4-80	570	8.0	325	.16	-	.16	-
		4-23-80	460	-	280	.78	.78	.76	.76
		5- 8-80	315	-	180	1.2	1.2	1.2	1.2
		5-22-80	285	-	161	1.2	1.2	1.2	1.2
		6-26-80	365	8.6	209	.21	-	.20	-
		7-16-80	465	-	271	.20	.20	.19	.19
		8-18-80	490	-	283	.00	.01	.00	.01
Mud Creek	30	9- 5-80	495	-	280	.23	-	-	-
	31	9- 5-80	520	-	298	.13	-	-	-
	33	9- 5-80	510	-	286	.00	-	-	-
	34	3-17-79	570	8.1	354	.16	-	.15	-
	35	12- 9-78	620	8.3	357	.13	-	.12	-
		6-14-79	320	8.1	171	.27	-	.26	-
		9-13-79	530	8.5	314	.01	-	.00	-
	36	11-16-79	610	-	391	.05	.05	.04	.04
		12-12-79	650	8.1	388	.12	-	.12	-
		12-14-79	620	-	-	.14	.22	.13	.21
		2- 6-80	580	-	-	.15	.16	.14	.15
		3- 4-80	590	8.2	342	.13	-	.13	-
		4-23-80	455	-	-	.63	.63	.60	.62
		5-28-80	335	-	192	.66	.67	.66	.66
		6-26-80	340	8.4	190	.09	-	.08	-
		7-16-80	445	-	254	.06	.08	.05	.07
		8-18-80	500	-	279	.00	.00	.00	.00
		10-16-80	560	8.3	338	.00	-	-	-
Price River	37	11-15-79	300	-	160	.10	.11	.09	.10
		12-14-79	310	-	-	.17	.17	.16	.16
		2- 6-80	335	-	-	.15	.15	.14	.14
		4-23-80	315	-	184	.36	.36	.32	.32
		5-28-80	300	-	168	.15	.15	.14	.14
		7-15-80	315	-	180	.08	.09	.07	.08
		8-20-80	290	-	168	.00	.00	.00	.00

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Milligrams per liter											
Nitrogen, nitrite (as N)		Nitrogen, ammonia plus organic (as N)		Nitrogen, ammonia (as N)		Nitrogen, organic (as N)		Phosphorus, (as P)		Phosphorus, orthophosphate (as P)	
Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
-	-	-	-	-	-	-	-	0.030	0.030	-	-
0.00	0.00	0.34	0.35	0.04	0.04	0.30	0.31	.010	.010	0.00	0.00
-	-	-	-	-	-	-	-	.010	-	-	-
.00	.00	.31	.32	.02	.02	.29	.30	.000	.000	.00	.00
.01	.02	1.1	1.2	.00	.06	1.1	1.1	.010	.010	.00	.01
.01	.01	.15	.29	.06	.06	.09	.23	.000	.010	.00	.00
.03	.03	.72	.80	.00	.08	.72	.72	.010	.050	.00	.00
.00	.00	.25	.62	.01	.01	.24	.61	.010	.050	.04	.04
.01	.01	.69	.70	.05	.06	.64	.64	.030	.120	.00	.02
.00	.00	.45	.46	.02	.03	.43	.43	.000	.010	.00	.01
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	.030	-	-	-
.00	.00	.30	.38	.03	.02	.27	.36	.010	.050	.00	.01
-	-	-	-	-	-	-	-	.020	-	-	-
.01	.01	.51	.51	.03	.03	.48	.48	.000	.020	.01	.01
-	.01	-	.97	-	.02	-	.95	-	.010	-	.01
.00	.01	.02	.13	.03	.03	.00	.10	.000	.000	.00	.00
.03	.03	.78	1.2	.06	.08	.72	1.1	.010	.210	.01	.01
.01	.01	.57	1.0	.01	.07	.56	.93	.030	.150	.03	.03
.01	.01	.63	.95	.04	.04	.59	.91	.020	.200	.05	.06
.00	.01	.52	.57	.05	.05	.47	.52	.040	.050	.02	.02
.00	.00	.44	.46	.06	.06	.38	.40	.010	.040	.00	.02
-	-	-	-	-	-	-	-	.030	-	-	-
.00	.00	.34	.59	.04	.03	.30	.56	.020	.030	.00	.01
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	.010	-	-	-
.00	.00	.21	.26	.03	.05	.18	.21	.010	.040	.00	.01
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	2.700	-	-	-
.00	.00	.91	1.8	.04	.04	.87	1.8	.010	.010	.01	.01
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	.010	-	-	-
.00	-	.27	.36	.04	-	.23	-	-	.010	.01	-
.00	-	.00	.35	.00	-	.00	-	-	.070	.01	-
.02	.02	1.0	3.2	.07	.07	.93	3.1	.050	1.600	.10	.33
.01	.01	1.2	1.3	.01	.03	1.2	1.3	.030	.400	.02	.05
.01	.02	2.2	20	.01	.07	2.2	20	.040	4.300	.04	.15
.01	-	.46	.64	.03	-	.43	-	-	.390	.01	-
.01	.01	.71	.96	.03	.03	.68	.93	.020	.040	.03	.03
.00	.00	.24	.33	.02	.03	.22	.30	.010	.020	.00	.01
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
.01	-	.15	.33	.00	-	.15	-	.020	.010	.00	-
.01	-	.18	.50	.00	-	.37	-	-	.110	.00	-
.01	-	.37	.62	.00	-	.60	-	-	.020	.01	-
.01	-	.60	.20	.01	-	.17	-	.020	.030	.00	-
.01	.01	1.2	1.2	.11	.11	1.1	1.1	.010	.010	.01	.01
.00	-	.43	.52	.06	-	.37	-	-	.010	.01	-
.01	.01	.90	1.0	.03	.03	.87	.97	.010	.040	.01	.03
.01	.01	.18	.26	.01	.03	.17	.23	.000	.030	.00	.00
.00	-	.62	.65	.00	-	.62	-	-	.050	.03	-
.03	.03	1.2	1.2	.08	.17	1.1	1.1	.020	.230	.03	.03
.00	.01	.27	.54	.03	.03	.24	.51	.030	.090	.03	.05
.01	-	.44	.91	.03	-	.41	-	-	.080	.03	-
.01	.01	.60	1.3	.01	.03	.59	1.3	.040	.050	.00	.01
.00	.00	.29	.29	.03	.03	.26	.26	.010	.020	.00	.01
-	-	.39	.65	-	.00	-	.65	.050	.270	-	-
.01	.01	.73	.80	.15	.22	.58	.58	.010	.010	.00	.01
.01	.01	1.3	1.3	.19	.19	1.1	1.1	.010	.030	.01	.01
.01	.02	2.0	2.1	.28	.39	1.7	1.7	.000	.010	.00	.01
.04	.04	.81	.84	.20	.22	.61	.62	.010	.030	.00	.01
.01	.01	.78	1.1	.09	.10	.69	1.0	.010	.030	.03	.04
.01	.01	.21	.90	.11	.11	.10	.79	.050	.050	.02	.02
.00	.00	.34	.58	.03	.15	.31	.43	.000	.030	.00	.01

Table 13.--Discharge, specific conductance, and temperature of water from selected stream sites

Site No.: See plate 1.
Time: Military.
Discharge: Instantaneous except for Price River (site 37), which is daily mean from October 25, 1979, to September 12, 1980.
Specific conductance: Field measurements.

Stream	Site No.	Date	Time	Discharge (ft^3/s)	Specific conductance (µmho/cm at 25°C)	Temperature (°C)
Fish Creek	2	10-25-79	1345	10	325	5.5
		6- 4-80	1200	549	315	7.5
		6- 6-80	1010	659	305	6.0
		6-17-80	1700	265	325	15.5
		6-25-80	1415	111	360	14.5
Pondtown Creek	4	5-18-79	--	33	400	6.0
		7-19-79	--	1.3	380	20.0
		9-19-79	--	.3	--	12.0
		10-24-79	--	1.3	450	8.0
		10-25-79	--	1.3	455	9.0
		5-13-80	2235	32	--	--
		5-14-80	1320	26	--	--
		5-20-80	1440	44	--	--
		5-20-80	2220	62	--	--
		5-22-80	2235	99	--	--
		5-28-80	1300	44	340	8.0
		6- 4-80	1415	50	335	10.5
		6- 6-80	1025	55	325	5.5
		6-11-80	1930	29	350	15.0
		6-17-80	--	15	380	15.5
		6-25-80	1235	9.3	405	12.5
		7-20-80	--	2.8	425	15.5
		7-29-80	1000	1.5	430	15.5
Eccles Canyon	29	5- 1-80	1445	46	445	4.5
		5-12-80	1740	7.2	--	--
		5-14-80	1515	7.2	--	--
		5-15-80	--	4.8	--	--
		5-27-80	1850	17	325	4.5
		5-28-80	1330	13	325	7.5
		6- 4-80	1010	23	290	4.5
		6- 4-80	1730	22	240	6.5
		6- 6-80	0935	26	265	4.0
		6-13-80	1215	32	275	6.5
		6-17-80	1545	24	295	11.0
		6-25-80	1720	11	295	14.0
		9-12-80	1215	1.8	505	8.5

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Table 13.--Discharge, specific conductance, and temperature of water from selected stream sites--Continued

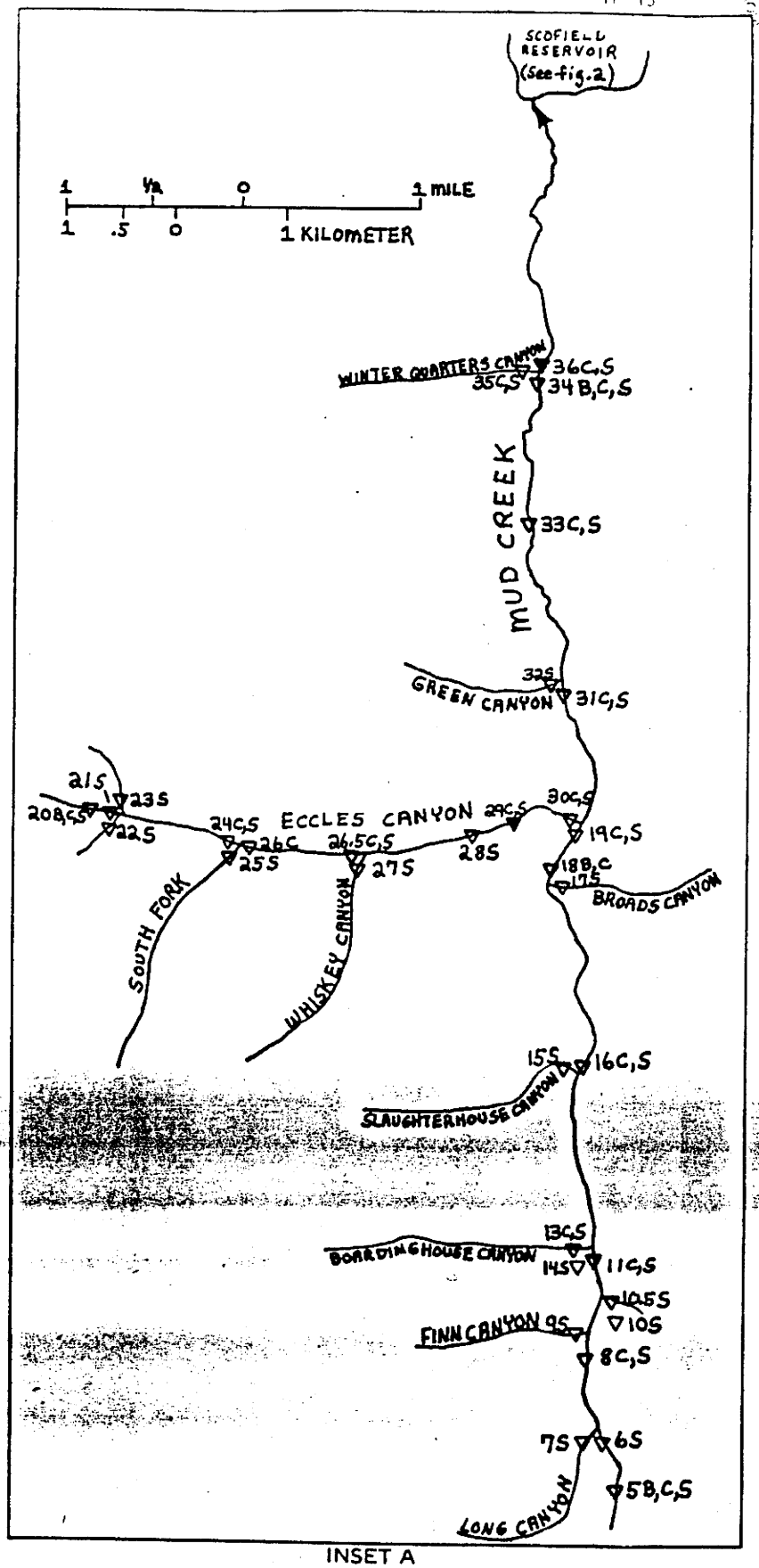
Stream	Site No.	Date	Time	Discharge (ft^3/s)	Specific conductance (µmho/cm at 25°C)	Temperature (°C)
Mud Creek	36	7-18-79	--	22	325	19.5
		10-25-79	1710	3.8	520	9.5
		12-14-79	0930	2.8	620	0.0
		5- 1-80	1330	30	410	6.0
		6- 4-80	0915	115	270	4.0
		6- 6-80	0950	135	260	4.5
		6-17-80	1610	79	290	12.5
		6-25-80	1700	46	325	16.0
Price River	37	5-18-79	--	2.1	400	8.0
		6-22-79	1000	1.3	320	14.5
		10-25-79	--	7.2	270	10.0
		12-14-79	--	6.0	310	4.0
		3-25-80	--	11	325	4.0
		6- 4-80	0950	645	295	9.5
		6- 5-80	0840	651	320	12.0
		6- 6-80	0840	682	320	11.0
		6- 6-80	0900	682	315	10.5
		6- 7-80	0820	694	320	10.0
		6- 8-80	0820	694	320	12.0
		6- 9-80	0915	682	325	10.0
		6-10-80	0825	682	325	12.0
		6-11-80	0820	669	325	12.0
		6-12-80	1225	651	325	14.0
		6-13-80	0815	639	325	14.0
		6-13-80	1425	639	310	12.0
		6-14-80	0740	603	325	11.0
		6-15-80	1030	574	325	15.0
		6-16-80	0945	538	330	12.0
		6-17-80	0845	491	325	14.0
		6-17-80	1250	491	310	13.0
		6-18-80	0835	395	330	14.0
		6-19-80	0815	374	330	16.0
		6-20-80	0800	279	330	14.0
		6-21-80	0815	271	330	14.0
		6-22-80	0810	257	330	14.0
		6-23-80	0735	225	325	15.0
		6-24-80	0840	215	330	15.0
		6-25-80	0820	201	330	16.0
		6-25-80	0845	201	320	12.5
		6-26-80	0815	192	330	15.0
		6-27-80	0820	186	330	15.0
		6-28-80	0815	185	335	14.0
		6-29-80	0810	203	335	17.0
		6-30-80	0825	195	330	17.0

Table 15.--Mineralogic analyses of streambed samples

Site No: See plate 1.
Visual estimates: tr, trace.

Stream	Site No.	Date	Particle-size diameter (mm)	Mineral composition (Percent by weight): Quartz	Potassium feldspar	Plagioclase feldspar	Calcite	Dolomite	Ankerite	Rhodochrosite	Goethite	Chlorite	Kaolinite	Illite	Montmorillonite	Mixed clay layer	Total	Visual estimates (Percent by volume): Organic	Pyrite	Coal
Gooseberry Creek	1	7-19-79	<0.476	37	2	3	24	5	3	4	0.1	0.4	2	7	0.4	0.1	88	0	0	tr
			<.062	37	4	4	12	4	0	3	2			16			82	—	—	—
			<.002	—	—	—	—	—	—	—	—	4	19	72	4	1	—	—	—	—
Fish Creek	2	7-18-79	<.476	69	2	0	11	0	0	1	0	0	3	0	0	3	89	0	0	0
			<.062	37	2	0	27	<.5	0	6	0			2			76	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	52	0	0	48	—	—	—	—
Pondtown Creek	3	7-18-79	<.476	74	4	.2	2	0	0	0	2	0	4	4	0	.9	91	0	0	0
			<.062	72	8	2	4	<.5	0	0	2			9			97	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	44	46	0	10	—	—	—	—
	4	7-18-79	<.476	71	2	.1	4	0	1	.1	3	0	4	4	0	2	91	tr	0	tr
			<.062	61	7	1	9	<.5	<.5	1	2			8			89	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	43	40	0	17	—	—	—	—
Mud Creek	5	7-17-79	<.476	75	4	.1	4	1	.3	0	2	0	3	3	0	2	94	0	0	.5
			<.062	77	8	1	1	1	1	<.5	0			10			99	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	37	33	0	30	—	—	—	—
	18	7-17-79	<.476	72	6	2	2	1	.1	1	3	0	3	4	0	2	96	0	0	3
			<.062	69	11	2	3	1	1	0	<.5			8			95	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	35	42	0	23	—	—	—	—
Eccles Canyon	20	7-17-79	<.476	60	3	.1	10	.9	.9	.9	3	0	5	2	0	.9	87	tr	0	tr
			<.062	69	7	1	6	<.5	<.5	<.5	0			8			91	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	58	30	0	12	—	—	—	—
	29	7-17-79	<.476	67	3	1	4	1	.9	0	3	0	4	2	0	2	88	0	0	3
			<.062	79	7	1	5	4	<.5	0	0			8			104	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	49	31	0	20	—	—	—	—
Mud Creek	34	7-17-79	<.476	67	2	2	4	1	.1	2	5	0	4	3	0	1	91	0	0	2
			<.062	62	5	1	7	1	1	1	0			9			87	—	—	—
			<.002	—	—	—	—	—	—	—	—	0	46	37	0	17	—	—	—	—
Soldier Creek	42	7-19-79	<.476	30	3	6	24	3	2	4	2	.8	.6	3	.8	3	82	0	0	0
			<.062	40	6	11	8	6	0	1	1			14			87	—	—	—
			<.002	—	—	—	—	—	—	—	—	9	7	39	10	35	—	—	—	—
Pine Canyon	51	7-19-79	<.476	38	2	1	25	4	3	3	2	.5	2	6	.7	2	89	tr	0	0
			<.062	46	4	3	11	6	1	2	1			12			88	—	—	—
			<.002	—	—	—	—	—	—	—	—	5	17	50	6	22	—	—	—	—
Soldier Creek	57	7-19-79	<.476	44	3	5	18	4	2	3	0	.6	1	4	.7	3	88	0	tr	0
			<.062	42	4	6	12	6	<.5	3	0			12			85	—	—	—
			<.002	—	—	—	—	—	—	—	—	7	14	37	8	35	—	—	—	—
	59	7-19-79	<.476	38	6	10	12	6	2	4	.3	.4	1	7	1	4	92	tr	0	0
			<.062	30	5	11	6	5	1	3	1			26			85	—	—	—
			<.002	—	—	—	—	—	—	—	—	3	10	52	7	28	—	—	—	—

SELECTED HYDROLOGIC DATA, PRICE RIVER BASIN, UTAH
WATER YEARS 1979 AND 1980
U.S. GEOLOGICAL SURVEY
OPEN FILE REPORT 82-916

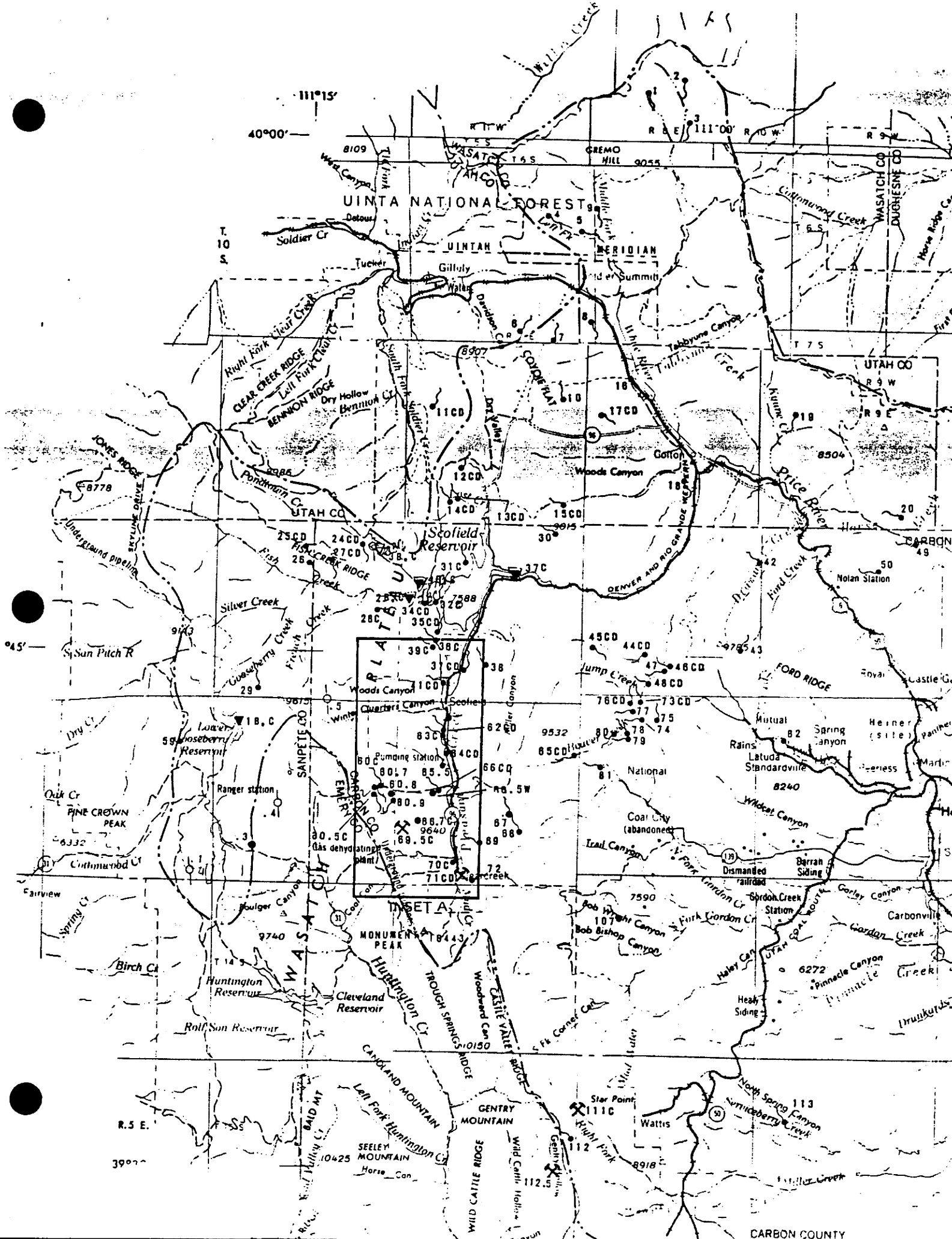


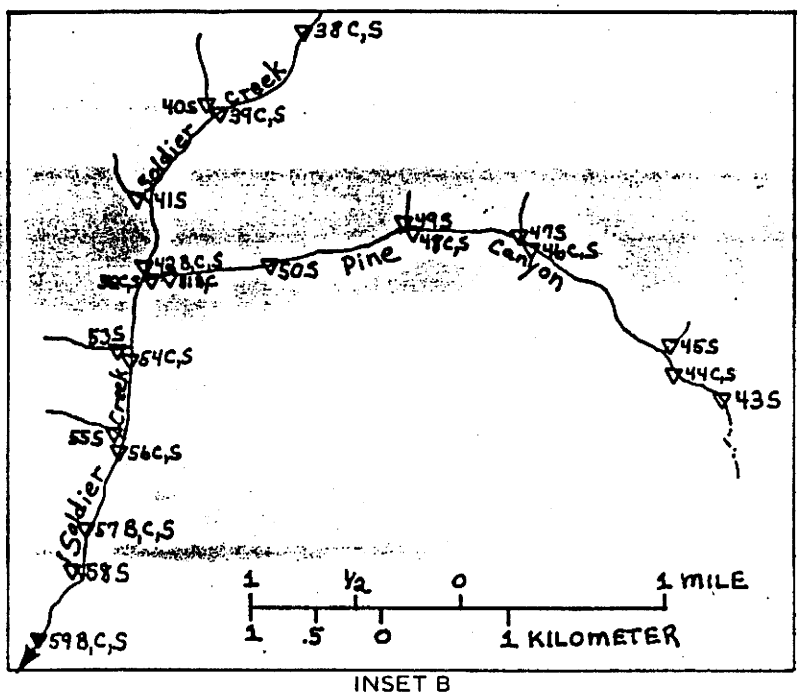
INSET A

Surface-water sites Scofield Reservoir area

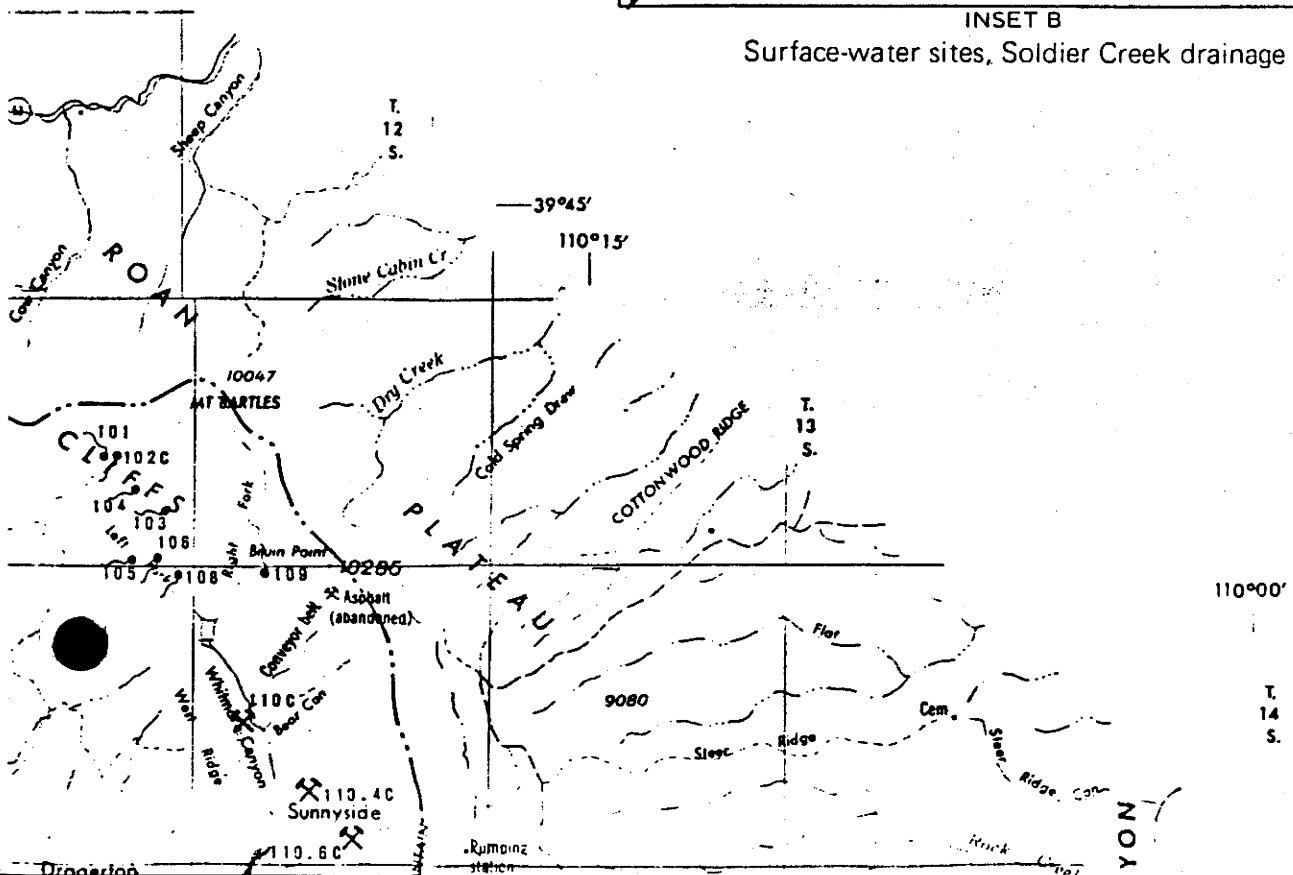
Base from U. S. Geological Survey 1:250,000 series Price, Utah (1956) and Salt Lake City, Utah (1954)

MAP SHOWING


111°15'
40°00'
111°00'
UINTA NATIONAL FOREST
WASATCH CO
UINTAH CO
UTAH CO
DUCHESNE CO
CARBON CO
SANPETE CO
EMERY CO
UINTAH MERIDIAN
GREMO HILL 9055
Soldier Cr
Tucker
Gilluly
Scofield Reservoir
Price River
Woods Canyon
Quarters Canyon
Scofield
Pumping station
Gas dehydrating plant
Ranger station
Nolan Station
Mutual
Latuda
Standardville
Coal City (abandoned)
Dismantled railroad
Barrau Siding
Gordon Creek Station
Carbonville
Heaty Siding
Star Point
Wattis
Huntington Reservoir
Cleveland Reservoir
Rolfson Reservoir
MONUMENT PEAK
GENTRY MOUNTAIN
SEELEY MOUNTAIN
CANDLAND MOUNTAIN
TROUGH SPRINGS RIDGE
CASTLE VALLEY RIDGE
WILD CATTLE RIDGE
BALD MT
PINE CROWN PEAK
CLEAR CREEK RIDGE
BENNION RIDGE
JONES RIDGE
FISH CREEK RIDGE
FORD RIDGE
SKYLINE DRIVE
DENVER AND RIO GRANDE WESTERN
INSET A
R.5 E.
T. 10 S.
CARBON COUNTY



INSET B
Surface-water sites, Soldier Creek drainage



APPENDIX D

SOILS AND ASSOCIATED RECLAMATION

SOILS AND ASSOCIATED RECLAMATION APPENDICES

APPENDIX D
SOILS AND ASSOCIATED RECLAMATION

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Winter Quarters Canyon
Data Adequacy

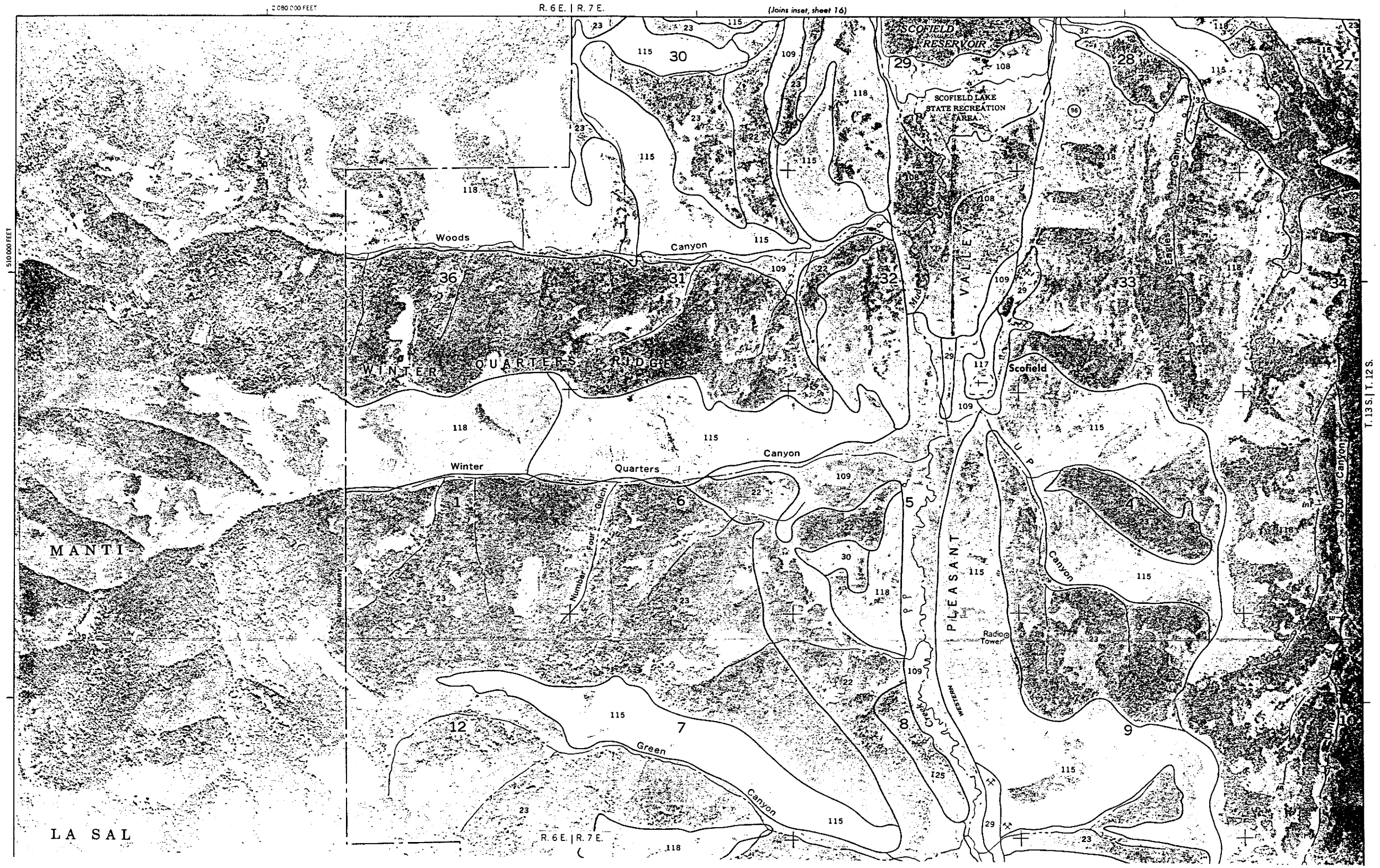
October 1992

SOIL SURVEY OF CARBON AREA, UTAH

United States
Department of
Agriculture
Soil
Conservation
Service

In cooperation with
United States Department
of the Interior, Bureau of
Land Management, and
Utah Agricultural
Experiment Station

Soil Survey of Carbon Area, Utah



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1975 through 1978 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Persayo loam, 3 to 8 percent slopes, is one of several phases in the Persayo series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes and associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Beje-Trag complex is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or

Included in this unit are about 10 percent soils that are similar to the Falcon soil but have a very stony surface layer and are adjacent to Rock outcrop and 5 percent soils that are similar to the Falcon soil but are moderately deep and are in draws.

The Falcon soil is shallow and well drained. It formed in residuum derived dominantly from sandstone. Typically, the surface layer is brown stony sandy loam about 5 inches thick. The underlying layer to a depth of 12 inches is brown sandy loam. Sandstone is at a depth of 12 inches. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Falcon soil is rapid. Available water capacity is about 1.0 to 1.5 inches. Water supplying capacity is 3 to 5 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is moderate.

Rock outcrop consists of areas of exposed sandstone. It dominantly occurs as ledges near the summits.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Falcon soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, mountain big sagebrush, bluegrass, and slender wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying.

The suitability of this unit for rangeland seeding is very poor. The main limitations are the shallow soil depth and steepness of slope.

The Falcon soil is in capability subclass VIIe, nonirrigated, and in the Mountain Shallow Loam (Mountain Big Sagebrush) range site. Rock outcrop is in capability subclass VIIIs. It is not placed in a range site.

31—Ferron silt loam. This very deep, poorly drained soil is on alluvial fans and alluvial valley bottoms. It is in the area extending from Spring Glen to Wellington. It formed in alluvium derived dominantly from shale and sandstone. Slopes are 0 to 3 percent. Slopes are 200 to 500 feet long and are concave. The present vegetation in most areas is mainly wiregrass, sedges, redtop, and saltgrass. Elevation is 5,400 to 5,700 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days.

Typically, the surface is covered with a mat of undecomposed organic matter 1 inch thick. The surface layer is light brownish gray silt loam about 3 inches thick. The underlying layer to a depth of 60 inches or more is light brownish gray loam and very fine sandy loam. Mottles are at a depth of 0 to 60 inches.

Included in this unit are about 5 percent Hunting loam and 5 percent Saltair silty clay loam.

Permeability of this Ferron soil is moderate. Available water capacity is about 7.5 to 10 inches. Effective rooting depth is limited by a seasonal high water table that is at a depth of 1.0 to 2.5 feet from January to December. The organic matter content of the surface layer is 2 to 4 percent. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland.

The potential plant community on the Ferron soil is 85 percent grasses, 10 percent forbs, and 5 percent shrubs. Among the important plants are Inland saltgrass, alkali sacaton, sedges, and Baltic rush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. The suitability of the unit for grazing is good.

The suitability of this unit for rangeland seeding is poor. The main limitations are the seasonal high water table and salinity. Plants suitable for seeding include alkali sacaton and tall wheatgrass.

This map unit is in capability subclass VIIw, nonirrigated, and in the Salt Meadow range site.

32—Frandsen-Gullied land complex. This map unit is on fan terraces. It is in the Whitmore Park area. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 1 to 8 percent, 200 to 400 feet long, and concave to convex. The present vegetation is mainly mountain big sagebrush, galleta, and yellowbrush. Elevation is 7,200 to 7,600 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 70 percent Frandsen loam, 1 to 8 percent slopes; 15 percent Gullied land; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Senchert family soils on ridges, 5 percent Rottulee family soils on ridges, 3 percent Trag loam in concave areas, and small areas of Brycan loam.

The Frandsen soil is very deep and well drained. Typically, the surface layer is reddish brown loam about 4 inches thick. The next layer is reddish brown loam and clay loam about 36 inches thick. Below this to a depth of 60 inches or more is reddish brown fine sandy loam.

Permeability of this Frandsen soil is moderate. Available water capacity is about 8 to 10 inches. Water supplying capacity is 11 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

soil is in the Mountain Very Steep Stony Loam (Browse) range site.

28—Doney-Toze families complex. This map unit is on mountain slopes about 5 miles west of Helper and in the vicinity of Wattis. Slopes are 50 to 90 percent. Elevation is 6,700 to 9,000 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 42 to 45 degrees F, and the average freeze-free period is 70 to 100 days.

This unit is 50 percent Doney family stony loam, 50 to 70 percent slopes; 25 percent Toze family loam, warm, 60 to 90 percent slopes; and 25 percent other soils and miscellaneous areas. The Doney family soil is in open areas that are dominantly under grass, and the Toze family soil is in areas under Douglas-fir. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Comodore very stony fine sandy loam, moist; 10 percent Datino loam; and 5 percent Rock outcrop.

The Doney family soil is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are convex, and have northeast aspect. The present vegetation in most areas is mainly Salina wildrye, mountain big sagebrush, serviceberry, aster, snowberry, birchleaf mountainmahogany, and lupine.

Typically, the surface layer is brown stony loam about 4 inches thick. The subsoil is pale brown loam about 11 inches thick. The substratum to a depth of 35 inches is light gray loam. Weathered shale is at a depth of 20 to 40 inches.

Permeability of the Doney family soil is moderate. Available water capacity is about 4.5 to 6.0 inches. Water supplying capacity is 7 to 11 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

The Toze family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long, are concave, and have north aspect. The present vegetation in most areas is mainly Douglas-fir, Salina wildrye, elk sedge, snowberry, quaking aspen, and golden rod.

Typically, the surface is covered with a mat of duff 2 inches thick. The upper part of the surface layer is dark grayish brown loam about 9 inches thick, and the lower part is dark grayish brown cobbly silt loam and gravelly silt loam about 22 inches thick. The next layer is pale brown cobbly silt loam about 13 inches thick. Below this to a depth of 60 inches or more is pale brown gravelly very fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 31 inches.

Permeability of the Toze family soil is moderate. Available water capacity is about 6.5 to 10.5 inches. Water supplying capacity is 9.5 to 16.0 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is high.

This unit is used for woodland, wildlife habitat, and mining operations.

The potential plant community on the Doney family soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, bluegrass, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope and the hazard of erosion.

The potential vegetation on the Toze family soil includes an overstory of Douglas-fir with a canopy of 75 percent. The understory vegetation is 15 percent grasses, 10 percent forbs, and 75 percent shrubs. Among the important plants are sedge, bluegrass, snowberry, and Utah serviceberry.

The site index for Douglas-fir is 60. Average yield is about 20,600 board feet per acre of 100-year-old trees 15 inches in diameter or more. The limitations for harvesting wood products are severe because of the steepness of slope and the hazard of erosion.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass VIIe. The Doney family soil is in the Mountain Very Steep Loam (Saline Wildrye) range site. The Toze family soil is in the Mountain Very Steep Loam (Douglas-fir) woodland site.

29—Dumps, mine. This map unit consists of piles of waste material from coal mines. The material is mostly coal, hard shale, and sandstone fragments. The fragments are about 0.5 to 7.0 inches in size and are angular in shape. Most areas of this unit are barren. Some areas have a 6- to 8-inch surface layer of mixed soil material and rock fragments. These areas support sparse vegetation of snowberry, Salina wildrye, rabbitbrush, and some annuals.

This map unit is in capability subclass VIIIs, nonirrigated. It is not placed in a range site.

30—Falcon-Rock outcrop complex. This map unit is on hillslopes near Scofield Reservoir. Slopes are 30 to 50 percent, 60 to 100 feet long, and convex to plane. The present vegetation in most areas is mainly mountain big sagebrush, needleandthread, native bluegrasses, and lupine. Elevation is 7,620 to 8,000 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 37 to 40 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 70 percent Falcon stony sandy loam, cool, 8 to 50 percent slopes; 15 percent Rock outcrop; and 15 percent other soils. The Falcon soil is on foot slopes and hillslopes, and the Rock outcrop occurs as ledges near the summits. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

saltbush, pubescent wheatgrass, ladak alfalfa, and small burnet.

This map unit is in capability subclass VIe, nonirrigated, and in the Upland Loam (Basin Big Sagebrush) range site.

26—Doney family, 50 to 70 percent slopes. This moderately deep, well drained soil is on mountain slopes. It is in the vicinity of Bruin Point and Price Canyon. It formed in residuum and colluvium derived dominantly from siltstone and shale. Slopes are 100 to 300 feet long, are slightly concave, and dominantly have south and west aspects. The present vegetation is mainly Salina wildrye, bluebunch wheatgrass, mountain big sagebrush, snowberry, and lupine. Elevation is 8,100 to 9,500 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 70 to 100 days.

Typically, the surface layer is brown stony loam about 4 inches thick. The subsoil is pale brown loam 11 inches thick. The substratum to a depth of 35 inches is light gray loam over shale. Depth to weathered shale ranges from 20 to 40 inches.

Included in this unit are about 10 percent Pathead extremely stony loam on side slopes, 5 percent Rottulee family loam in drainageways, and small areas of a Midfork family soil that has slopes of 50 to 70 percent and has north and east aspects, Rock outcrop that occurs as ledges, and Curecanti family soil in the Price Canyon area.

Permeability of the Doney family soil is moderate. Available water capacity is about 4.5 to 6.0 inches. Water supplying capacity is 7 to 11 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is moderate.

This unit is used as wildlife habitat and rangeland.

The potential plant community on the Doney family soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, bluegrass, and snowberry.

This unit is not grazeable by livestock because of the steepness of slope and the hazard of erosion.

This map unit is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Loam (Saline Wildrye) range site.

27—Doney family-Podo complex. This map unit is on mountain slopes near Bruin Point and Beaver Ridge. Slopes are 40 to 70 percent, 200 to 300 feet long, and concave. The present vegetation is mainly big sagebrush, Salina wildrye, serviceberry, and birchleaf mountainmahogany. Elevation is 8,000 to 9,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 70 to 100 days.

This unit is 55 percent Doney family stony loam, 50 to 70 percent slopes; 35 percent Podo very stony loam, 40 to 70 percent slopes; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Rock outcrop, small areas of Midfork family bouldery loam in drainageways, and 2 percent Senchert loam, 30 to 50 percent slopes.

The Doney family soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone and shale. Typically, the surface layer is brown stony loam about 4 inches thick. The subsoil is pale brown loam about 11 inches thick. The substratum is light gray loam over shale at a depth of 35 inches. Depth to weathered shale ranges from 20 to 40 inches.

Permeability of the Doney family soil is moderate. Available water capacity is about 4.5 to 6.0 inches. Water supplying capacity is 7 to 11 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is moderate.

The Podo soil is shallow and well drained. It formed in residuum derived dominantly from sandstone and shale. Typically, the surface layer is grayish brown very stony loam about 5 inches thick. The underlying material to a depth of 16 inches is light brownish gray loam over shale. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Podo soil is moderately rapid. Available water capacity is about 2 to 3 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Doney family soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, bluegrass, and snowberry.

This unit is not grazeable by livestock because of steepness of slope and the hazard of erosion.

The potential plant community on the Podo soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany and serviceberry.

For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the unit and intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

This unit is not usable by livestock because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated. The Doney family soil is in the Mountain Very Steep Loam (Saline Wildrye) range site. The Podo

The potential plant community on the Pathead very bouldery fine sandy loam is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are curlleaf mountainmahogany, Salina wildrye, Utah serviceberry, and snowberry.

This soil is not grazeable by livestock because of the steepness of slope.

The potential plant community on the Pathead extremely stony loam is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, prairie junegrass, bluegrass, and snowberry.

This soil is not grazeable by livestock because of the steepness of slope and the hazard of erosion.

This map unit is in capability subclass VIIe, nonirrigated. The Curecanti family soil is in the Mountain Very Steep Loam (Oak) range site. The Pathead very bouldery fine sandy loam is in the Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany) range site. The Pathead extremely stony loam is in the Mountain Very Steep Loam (Saline Wildrye) range site.

24—Datino Variant very stony loam, 50 to 80 percent slopes. This very deep, well drained soil is on mountain slopes. It is near the upper end of Three Canyon, Trail Canyon, and Whitmore Canyon. It formed in colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are slightly convex. The present vegetation is mainly Gambel oak, serviceberry, and birchleaf mountainmahogany. Elevation is 6,800 to 8,700 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

Typically, the surface layer is dark grayish brown very stony loam about 4 inches thick. The subsoil is grayish brown very cobbly loam about 10 inches thick. The upper 8 inches of the substratum is pale brown very cobbly loam, and the lower part to a depth of 60 inches or more is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Included in this unit are about 10 percent Perma soils that have slopes of 60 to 80 percent. Areas of this soil are intermingled with areas of the Datino Variant soil.

Permeability of this Datino Variant soil is moderate. Available water capacity is about 4.0 to 6.5 inches. Water supplying capacity is 7 to 9 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used for wildlife habitat.

The potential plant community on the Datino Variant soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Columbia needlegrass, mountain brome, Gambel oak, snowberry, and Utah serviceberry.

This unit is not grazeable by livestock because of the steepness of slope.

The potential plant community on the Datino Variant soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Gambel oak, snowberry, serviceberry, and bluegrass.

This unit is not grazeable by livestock because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Loam (Oak) range site.

25—Doney family, 3 to 15 percent slopes. This moderately deep, well drained soil is on benches and foot slopes near the Stone Cabin gas fields and Dry Creek. It formed in residuum derived dominantly from sandstone, siltstone, and shale. Slopes are 200 to 300 feet long and are concave to convex. The present vegetation in most areas is mainly Wyoming big sagebrush, Salina wildrye, western wheatgrass, and needleandthread. Elevation is 7,000 to 8,000 feet. The average annual precipitation is 14 to 16 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 85 to 105 days.

Typically, the surface layer is light brownish gray silt loam 4 inches thick. The subsoil is pale brown loam 14 inches thick. The substratum to a depth of 36 inches is light gray loam. Depth to weathered shale ranges from 20 to 40 inches.

Included in this unit are about 10 percent Podo gravelly sandy loam, dry, at the lower elevations throughout the unit and 5 percent Haverdad loam, moist, in draws.

Permeability of this Doney family soil is moderate. Available water capacity is about 5.5 to 7.0 inches. Water supplying capacity is 7 to 9 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 2 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Doney family soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are basin big sagebrush, western wheatgrass, Indian ricegrass, and needleandthread.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and broadcast seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, chaining, and railing.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include those native to the unit, crested wheatgrass, Russian wildrye, fourwing

Permeability of this Croydon soil is moderately slow. Available water capacity is about 7 to 9 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is severe.

This unit is used as rangeland, woodland, and wildlife habitat.

The vegetation on the Croydon soil includes an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This unit is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. Production of aspen is about 40 cubic feet per acre per year. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion. If wood products are harvested, care should be taken to minimize the risk of erosion. Proper design of road drainage systems is essential.

The suitability of this unit for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability of this unit for rangeland seeding is poor because of the steepness of slope and competition from aspen.

This unit is in capability subclass VIIe, nonirrigated, and in High Mountain Loam (Aspen) woodland site.

23—Curecanti family-Pathead complex. This map unit is on mountain slopes in the area of Price Canyon. Slopes are 40 to 70 percent, 300 to 400 feet long, and plane to concave. Elevation is 7,000 to 9,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 30 percent Curecanti family loam, 50 to 70 percent slopes; 25 percent Pathead extremely bouldery fine sandy loam, 40 to 70 percent slopes; 25 percent Pathead extremely stony loam, 50 to 70 percent slopes; and 20 percent other soils. About 10 percent of the unit has slopes of 40 to 50 percent. The Curecanti family soil has southwest and southeast aspects and is along small stabilized drainageways, and the other soils are intermingled throughout the unit.

Included in this unit are about 10 percent Perma family soils in drainageways, 7 percent Midfork family soils that have slopes of 50 to 70 percent and are in the deeper drainageways, and small areas of Senchert family soils in concave areas.

The Curecanti family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Gambel oak, snowberry, slender wheatgrass, and Sandberg bluegrass.

Typically, the upper part of the surface layer is dark grayish brown loam about 7 inches thick and the lower part is brown very stony loam about 8 inches thick. The subsurface layer is very pale brown very stony loam about 5 inches thick. The subsoil to a depth of 60 inches or more is pale brown very stony loam.

Permeability of the Curecanti family soil is moderate. Available water capacity is about 5.0 to 6.5 inches. Water supplying capacity is 8 to 12 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is severe.

The Pathead extremely bouldery fine sandy loam is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly curlleaf mountainmahogany, Salina wildrye, and Gambel oak.

Typically, the surface layer is pale brown extremely bouldery fine sandy loam about 4 inches thick. The underlying material to a depth of 38 inches is pale brown and very pale brown very stony fine sandy loam. Depth to hard sandstone ranges from 20 to 40 inches.

Permeability of this Pathead soil is moderate. Available water capacity is about 1.3 to 3.0 inches. Water supplying capacity is 4.0 to 8.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is slight.

The Pathead extremely stony loam is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone and shale. The present vegetation is mainly Salina wildrye, black sagebrush, and winterfat.

Typically, the surface layer is brown extremely stony loam about 3 inches thick. The underlying material to a depth of 26 inches is pale brown very cobbly loam. Sandstone is at a depth of 20 to 40 inches.

Permeability of this Pathead soil is moderate. Available water capacity is about 1 to 2 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is slight.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Curecanti family soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Gambel oak, snowberry, and bluegrass.

This soil is not grazeable by livestock because of the steepness of slope.

is mainly Douglas-fir, pinyon, Salina wildrye, bluebunch wheatgrass, snowberry, and serviceberry.

Typically, the surface layer is brown extremely stony fine sandy loam about 9 inches thick. The subsoil is brown very stony loam about 7 inches thick. The substratum to a depth of 60 inches or more is pale brown very stony fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 16 inches.

Permeability of the Datino Variant soil is moderate. Available water capacity is about 4 to 6 inches. Water supplying capacity is 6 to 8 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as wildlife habitat and woodland.

The potential vegetation on the Comodore and Datino Variant soils includes an overstory of Rocky Mountain Douglas-fir and pinyon with a canopy of 50 percent. The understory vegetation is 40 percent grasses, 15 percent forbs, and 45 percent shrubs. Among the important plants are Salina wildrye, slender wheatgrass, birchleaf mountainmahogany, and snowberry.

This unit is limited for harvesting wood products because of the steepness of slope, stones and boulders on the surface, and the areas of Rock outcrop.

This unit is not grazeable by livestock because of the steepness of slope.

This unit is in capability subclass VIIe, nonirrigated, and in the Mountain Very Steep Stony Loam (Douglas-fir) woodland site.

21—Croydon loam, 8 to 30 percent slopes. This deep, well drained, moderately slowly permeable soil is on foot slopes. It is between Winter Quarts Canyon and Boardinghouse Canyon, south of Scofield. It formed in alluvium derived dominantly from shale and sandstone. Slopes are about 300 to 400 feet long, are concave to convex, and mostly have east aspect. The present vegetation in most areas is mainly quaking aspen, blue wildrye, slender wheatgrass, peavine, bearded wheatgrass, and silver sagebrush. Elevation is 7,800 to 9,500 feet. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

Typically, the surface layer is dark yellowish brown and yellowish brown loam about 16 inches thick. The subsurface layer is very pale brown loam about 7 inches thick. The subsoil to a depth of 48 inches is light yellowish brown clay loam over weathered sandstone. Depth to weathered sandstone ranges from 40 to 60 inches or more.

Included in this unit are 5 percent soils that are similar to this Croydon soil but has about 25 percent cobbles in the surface layer and 5 percent Croydon loam that has slopes of 30 to 50 percent.

Permeability of this Croydon soil is moderately slow. Available water capacity is 7 to 9 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is slight.

This unit is used as rangeland, woodland, and wildlife habitat and for urban development.

The potential vegetation on the Croydon soil includes an overstory of aspen with a canopy of 40 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This unit is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. Production of aspen is about 40 cubic feet per year. Minimizing the risk of erosion is essential in harvesting timber. The main limitation for the harvesting of wood products is the steepness of slope.

The suitability of this unit for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability for rangeland seeding is poor. The main limitation is competition from aspen.

This map unit is in capability subclass VIe, nonirrigated, and in High Mountain Loam (Aspen) woodland site.

22—Croydon loam, 30 to 50 percent slopes. This deep, well drained, moderately slowly permeable soil is on mountain slopes in the vicinity of Pleasant Valley. It formed in alluvium and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long, are concave to convex, and have north and east aspects. The present vegetation in most areas is mainly quaking aspen, snowberry, blue wildrye, slender wheatgrass, and peavine. Elevation is 7,800 to 9,500 feet. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free season is 40 to 60 days.

Typically, the surface layer is dark yellowish brown and yellowish brown loam about 16 inches thick. The subsurface layer is very pale brown loam about 7 inches thick. The subsoil to a depth of 48 inches is light yellowish brown clay loam over weathered sandstone. Depth to sandstone ranges from 40 to 60 inches or more.

Included in this unit are about 5 percent Uinta family soils under conifers and small areas of a soil that is about 10 inches thick over sandstone. Also included are small areas of Croydon loam that has slopes of 8 to 30 percent and Trag stony loam.

loam on alluvial fans at the foot of the mountain slopes. Also included are small areas of soils that are similar to this Silas soil but are poorly drained and are adjacent to Scofield Reservoir and in low areas.

Permeability of this Silas soil is moderate. Available water capacity is about 9 to 11 inches. Effective rooting depth is 60 inches or more for water-tolerant plants but is limited to 20 to 40 inches for non-water-tolerant plants. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is none.

This unit is used for irrigated pasture, grass hay, rangeland, and wildlife habitat.

The potential plant community on the Silas soil is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are sedges, tufted hairgrass, willow, shrubby cinquefoil, and clover.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this unit for grazing is good. The main limitations are the high water table and potential water pollution. Livestock grazing should be managed to protect the streambanks from excessive erosion.

This map unit is in capability subclass VIw, nonirrigated, and in the Mountain Meadow range site.

109—Silas-Brycan loams. This map unit is in narrow alluvial valleys and fans. It is in Pleasant Valley, along Mud Creek; along the Price River, below Scofield Reservoir; along Beaver Creek; and at the head of Jump Creek. Slopes are 0 to 8 percent. Elevation is 7,700 to 8,600 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 80 days.

This unit is 65 percent Silas loam, wet, 0 to 3 percent slopes; 20 percent Brycan loam, 3 to 8 percent slopes; and 15 percent other soils. The Silas soil is in low areas adjacent to the stream channel, and the Brycan soil is on alluvial fans adjacent to the narrow alluvial valleys. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of soils that are similar to the Silas soil but are poorly drained; soils that are similar to the Silas soil but have slopes of 3 to 6 percent; flooded areas of soils, adjacent to streams, that have a loamy very fine sand surface layer 8 to 12 inches thick; and soils that are similar to the Brycan soil but are about 30 percent pebbles throughout.

The Silas soil is very deep and somewhat poorly drained. It formed in alluvium derived dominantly from sandstone and shale of the Black Hawk Formation. Slopes are 300 to 500 feet long and are plane to concave. The present vegetation in most areas is mainly silver sagebrush, bluegrasses, sedges, wiregrass, and scattered Colorado blue spruce. Typically, the surface layer is dark grayish brown loam about 28 inches thick. The next layer is grayish brown loam about 15 inches thick. Below this to a depth of 60 inches or more is light brownish gray sandy clay loam. Mottles are at a depth of 28 to 60 inches. A water table fluctuates between depths of 20 and 25 inches in spring and between depths of 35 and 45 inches during the drier season. In some areas this soil is about 20 percent pebbles and cobbles at a depth of 36 inches. In some areas this soil is stratified. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Permeability of the Silas soil is moderate. Available water capacity is about 9 to 11 inches. Effective rooting depth is 60 inches or more for water-tolerant plants but is limited to 18 to 24 inches for non-water-tolerant plants. The organic matter content of the surface layer is 5 to 10 percent. Runoff is slow, and the hazard of water erosion is none.

The Brycan soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale of the Black Hawk Formation. Slopes are 100 to 200 feet long and are plane to convex. The present vegetation in most areas is mainly mountain big sagebrush and rabbitbrush. Typically, the surface layer is dark grayish brown and brown loam 12 inches thick. The subsoil is brown loam 20 inches thick. The substratum to a depth of 60 inches or more is brown silt loam.

Permeability of the Brycan soil is moderately slow. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 2 to 4 percent. Runoff is medium, and the hazard of water erosion is moderate.

Most areas of this unit are used for irrigated pasture, rangeland, and wildlife habitat. A few areas are used for urban development.

The potential plant community on the Silas soil is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are sedges, tufted hairgrass, willow, shrubby cinquefoil, and clover.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of the Silas soil for grazing is good. The main limitations are the fluctuating water table and the potential for pollution of water. Livestock grazing should be managed to protect the streambanks from erosion. If possible no other revegetation practices should be applied because this soil is a critical wildlife area.

The potential plant community on the Brycan soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are bluebunch

wheatgrass, Letterman needlegrass, Salina wildrye, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of the Brycan soil for rangeland seeding is good. Plants suitable for seeding include those native to the soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability of this soil for grazing is good.

This map unit is in capability subclass VIw, nonirrigated. The Silas soil is in the Mountain Meadow range site. The Brycan soil is in the Mountain Loam (Saline Wildrye) range site.

110—Stormitt gravelly sandy clay loam, 3 to 10 percent slopes. This very deep, well drained soil is on benches near Helper, Price, and the Carbon-Emery county line. It formed in glacial outwash derived dominantly from sandstone, quartzite, and shale. Slopes are 200 to 400 feet long and are concave to convex. The present vegetation in most areas is mainly galleta, shadscale, black sagebrush, and Indian ricegrass. Elevation is 5,450 to 6,200 feet. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is pale brown gravelly sandy clay loam about 1 inch thick. The subsoil is light yellowish brown and brownish yellow gravelly sandy clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is very pale brown very cobbly sandy clay loam. In some areas the surface layer has been lost through erosion.

Included in this unit are about 5 percent Minchey loam in draws and 5 percent soils that are similar to this Stormitt soil but are 20 to 40 inches deep to sandstone and are on ridges.

Permeability of this Stormitt soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is moderate, and the hazard of water erosion is slight. In places shallow gullies have formed.

This unit is used as rangeland in spring and fall.

The potential plant community on the Stormitt soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Wyoming big sagebrush, Indian ricegrass, galleta, and needleandthread.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this unit for rangeland seeding is poor. The main limitations are the stoniness of the soil and the low annual precipitation. Plants suitable for seeding include those native to the unit and crested wheatgrass, pubescent wheatgrass, and prostrate kochia.

This map unit is in capability subclass VIIs, nonirrigated, and in the Semidesert Gravelly Loam (Wyoming Big Sagebrush) range site.

111—Stormitt-Minchey complex. This map unit is on benches and mesas near Price, Wellington, and the Carbon-Emery county line. Slopes are 1 to 10 percent. The present vegetation in most areas is mainly galleta, shadscale, Wyoming big sagebrush, and Indian ricegrass. Elevation is 5,500 to 6,000 feet.

This unit is 55 percent Stormitt gravelly sandy clay loam, 3 to 10 percent slopes, eroded; 35 percent Minchey loam, 1 to 3 percent slopes; and 10 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 10 percent Mivida very fine sandy loam.

The Stormitt soil is very deep and well drained. It formed in glacial outwash derived dominantly from sandstone, shale, and quartzite. Slopes are 100 to 300 feet long and are concave to convex. The average annual precipitation is 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days. Typically, the surface layer is pale brown gravelly sandy clay loam about 1 inch thick. The subsoil is light yellowish brown and brownish yellow gravelly sandy clay loam about 8 inches thick. The substratum to a depth of 60 inches or more is very pale brown very cobbly sandy clay loam. In some areas the surface layer has been lost through erosion.

Permeability of the Stormitt soil is moderate. Available water capacity is about 5 to 7 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 2 percent. Runoff is moderate, and the hazard of water erosion is medium. In places shallow gullies have formed.

The Minchey soil is very deep and well drained. It formed in moderately fine textured glacial outwash derived dominantly from sandstone, quartzite, and shale. Slopes are 200 to 400 feet long and are convex. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 48 to 50 degrees F, and the average freeze-free period is 115 to 140 days. Typically, the surface layer is pale brown loam 3 inches thick. The next layer is brown, pale brown, or very pale brown clay loam or sandy clay loam about 29 inches thick. Below this to a depth of 60 inches or more is pale

brown or light yellowish brown gravelly sandy loam and very gravelly sandy loam.

Permeability of the Minchey soil is moderate. Available water capacity is about 7.0 to 8.5 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 0.5 to 1.0 percent. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as rangeland in spring and fall.

The potential plant community on the Stormitt soil is 35 percent grasses, 10 percent forbs, and 55 percent shrubs. Among the important plants are Wyoming big sagebrush, Indian ricegrass, galleta, and needleandthread.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of the Stormitt soil for rangeland seeding is poor. The main limitations are the stoniness of the soil and the low annual precipitation. Plants suitable for seeding include those native to the soil and crested wheatgrass, pubescent wheatgrass, and prostrate kochia.

The potential plant community on the Minchey soil is 50 percent grasses, 10 percent forbs, and 40 percent shrubs. Among the important plants are galleta, Indian ricegrass, shadscale, and winterfat.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Severe drought may adversely affect the production of the perennial vegetation. Partial or total removal of livestock from the range may be necessary.

It is not practical to revegetate large areas of the Minchey soil because of the low annual precipitation. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are adapted native plants.

This map unit is in capability subclass VIIs, nonirrigated. The Stormitt soil is in the Semidesert Gravelly Loam (Wyoming Big Sagebrush) range site. The Minchey soil is in the Desert Loam range site.

112—Strych very bouldery fine sandy loam, 3 to 20 percent slopes. This very deep, well drained soil is on dissected alluvial fans and fan terraces. It is in the vicinity of Horse Canyon. It formed in alluvium and glacial outwash derived dominantly from sandstone and shale. Slopes are 200 to 300 feet long, are convex, and have south, east, and west aspects. The present vegetation is mainly juniper, pinyon, Mormon-tea, and pricklypear. Elevation is 5,300 to 6,100 feet. The average annual precipitation is about 8 to 12 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 115 to 140 days.

Typically, the surface layer is pale brown very bouldery fine sandy loam 3 inches thick. The next layer is pale brown very stony sandy loam 21 inches thick. Below this to a depth of 60 inches or more is light yellowish brown very cobbly sandy loam.

Included in this unit are small areas of Strych very stony loam, 3 to 15 percent slopes; Strych very stony loam, dry; and Gerst soils that are dry and have slopes of 15 to 40 percent.

Permeability of this Strych soil is moderately rapid. Available water capacity is about 3.5 to 7.0 inches. Water supplying capacity is 4 to 5 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Strych soil is 55 percent grasses, 10 percent forbs, and 35 percent shrubs. Among the important plants are Indian ricegrass, shadscale, Salina wildrye, and galleta.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this unit for rangeland seeding is very poor. The main limitation is boulders on the surface. The suitability for grazing is fair.

This map unit is in capability subclass VIIs, nonirrigated, and in the Semidesert Bouldery Loam range site.

113—Strych very stony loam, 3 to 15 percent slopes. This very deep, well drained soil is on benches and outwash plains. It is in the mouths of canyons near Helper and Sunnyside and south of Pace Canyon and along the north fork of Gordon Creek, near Cedar Bench. This soil formed in glacial outwash and alluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are concave to convex. The present vegetation is mainly pinyon, Utah juniper, Salina wildrye, Indian ricegrass, black sagebrush, and birchleaf mountainmahogany. Elevation is 5,800 to 7,200 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 100 to 120 days.

Typically, the surface layer is pinkish gray very stony loam about 5 inches thick. The next layer is light gray and very pale brown very stony loam about 42 inches thick. Below this to a depth of 60 inches or more is very pale brown very cobbly sandy loam. A layer of secondary calcium carbonate accumulation is at a depth of about 5 inches.

Included in this unit are about 15 percent Chupadera fine sandy loam and small areas of weakly developed soils that are similar to this Strych soil but have a cobbly

surface layer, Atrac very fine sandy loam, and Hernandez family very fine sandy loam.

Permeability of this Strych soil is moderately rapid. Available water capacity is about 4.0 to 7.5 inches. Water supplying capacity is 4 to 7 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Strych soil includes an overstory of pinyon and Utah juniper with a canopy of 30 percent. The understory vegetation is 45 percent grasses, 10 percent forbs, and 45 percent shrubs. Among the important plants are birchleaf mountainmahogany, black sagebrush, Salina wildrye, and needleandthread.

The site index for pinyon and Utah juniper is 65. Average yield is 9 cords of wood per acre. The potential for the production of posts or Christmas trees is good. Limitations for the harvesting of Christmas trees are slight.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the pinyon and Utah juniper are thinned, the desirable plants present can be expected to increase for a short period before the pinyon and Utah juniper revegetate the unit. Suitable brush management practices include prescribed burning, chaining, and cutting.

The suitability of this unit for rangeland seeding is poor. The main limitation is the stoniness of the surface layer.

This map unit is in capability subclass VIIs, nonirrigated, and in the Upland Stony Loam (Pinyon-Utah Juniper) woodland site.

114—Strych very stony loam, dry, 3 to 30 percent slopes. This very deep, well drained soil is on alluvial fans and terraces. It is at the foot of the Book Cliffs, extending from Horse Canyon to the town of Wattis. This soil formed in alluvium and glacial outwash derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are concave to convex. The present vegetation is mainly Utah juniper, pinyon, Salina wildrye, Indian ricegrass, and Mormon-tea. Elevation is 5,400 to 6,400 feet. The average annual precipitation is about 8 to 12 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is pale brown very stony loam about 3 inches thick. The next layer is pale brown very stony sandy loam about 21 inches thick. Below this to a depth of 60 inches or more is light yellowish brown very cobbly sandy loam.

Included in this unit are about 10 percent Mivida gravelly fine sandy loam and 5 percent Hernandez family loam.

Permeability of this Strych soil is moderately rapid. Available water capacity is about 3.5 to 7.0 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Strych soil includes an overstory of Utah juniper and pinyon with a canopy of 25 percent. The understory vegetation is 35 percent grasses, 15 percent forbs, and 50 percent shrubs. Among the important plants are Utah juniper, black sagebrush, galleta, and needleandthread.

The site index for Utah juniper and pinyon is 40. Average yield is 6 cords of wood per acre. The potential for the production of posts or Christmas trees is good. This unit is moderately limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion. If wood products are harvested, the slash should be left scattered on the surface to protect the soil from erosion.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If Utah juniper and pinyon are thinned, the desirable plants present can be expected to increase for a short period before the Utah juniper and pinyon revegetate the unit.

The suitability of this unit for rangeland seeding is poor. The main limitations are the content of rock fragments on and in the soil, low annual precipitation, and competition from Utah juniper and pinyon. Broadcast seeding followed by surface dragging of an anchor chain or drag rail to cover the seed is a suitable practice. Plants that may be suitable for seeding are pubescent wheatgrass, crested wheatgrass, and adapted native plants.

This map unit is in capability subclass VIIs, nonirrigated, and in the Semidesert Stony Loam (Utah Juniper-Pinyon) woodland site.

115—Trag stony loam, 30 to 60 percent slopes. This deep, well drained soil is on mountain slopes east and west of Pleasant Valley. It formed in colluvium and alluvium derived dominantly from sandstone and shale. Slopes are 200 to 300 feet long and are concave to convex. About 75 percent of the soil has slopes of 30 to 50 percent. The present vegetation in most areas is mainly mountain big sagebrush, bluebunch wheatgrass, bitterbrush, rabbitbrush, and lupine. Elevation is 7,600 to 7,900 feet. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 36 to 40

degrees F, and the average freeze-free period is 60 to 80 days.

Typically, the surface layer is dark grayish brown stony loam about 10 inches thick. The subsoil is dark grayish brown clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown and very pale brown clay loam.

Included in this unit are about 5 percent soils that are similar to the Trag soil but have a thin surface layer, 5 percent soils that are similar to this Trag soil but have a bouldery loam surface layer, 5 percent soils that are similar to this Trag soil but have 15 to 35 percent rock fragments in the subsoil, 5 percent Falcon stony sandy loam, and 5 percent Rock outcrop.

Permeability of this Trag soil is moderate. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is poor because of the steepness of slope. Plants suitable for seeding include those native to this unit and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability of the unit for grazing is poor because of the steepness of slope.

This map unit is in capability subclass VIIe, nonirrigated, and in the Mountain Loam (Saline Wildrye) range site.

116—Trag-Beje-Rottulee family complex. This map unit is on plateaus near Emma Park. Slopes are 3 to 30 percent. The present vegetation is mainly mountain big sagebrush, western wheatgrass, and Salina wildrye. Elevation is 7,200 to 7,400 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days.

This unit is 40 percent Trag loam, 3 to 8 percent slopes; 20 percent Beje loam, 3 to 15 percent slopes; 15 percent Rottulee family loam, 15 to 30 percent slopes; and 25 percent other soils. The Trag soil is on valley floors, the Beje soil is on benches and low ridges, and the Rottulee family soil is on valley sides. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 10 percent Trag stony loam on the sides of ridges, 10 percent Doney family soils that have slopes of 15 to 40 percent and are on hillslopes and summits, and small areas of Silas loam in draws, Brycan loam, and Falcon stony sandy loam.

The Trag soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and are concave. Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is brown and light brown clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability of the Trag soil is moderate. Available water capacity is about 9 to 11 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is slow, and the hazard of water erosion is slight.

The Beje soil is shallow and well drained. It formed in colluvium and residuum derived dominantly from sedimentary rock of the Green River Formation. Slopes are 100 to 200 feet long and are concave to convex. Typically, the surface layer is brown loam about 6 inches thick. The subsoil to a depth of 14 inches is brown clay loam over sandstone. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Beje soil is moderate. Available water capacity is 2 to 3 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate.

The Rottulee family soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 100 to 200 feet long and are concave to convex. Typically, the surface layer is reddish brown loam about 2 inches thick. The upper 13 inches of the subsoil is reddish brown loam and clay loam, and the lower 8 inches is reddish brown gravelly silty clay loam. The substratum to a depth of 34 inches is reddish brown gravelly silt loam. Depth to shale ranges from 20 to 40 inches.

Permeability of the Rottulee family soil is moderate. Available water capacity is about 5 to 6 inches. Water supplying capacity is 7 to 10 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is moderate, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as rangeland, wildlife habitat, and recreation areas.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve

the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this soil for rangeland seeding is good. Plants suitable for seeding include those native to the soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability for grazing is good.

The potential plant community on the Beje soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, mountain big sagebrush, snowberry, and slender wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying.

The suitability of this soil for rangeland seeding is very poor. The main limitations are the shallow soil depth and steepness of slope.

The potential plant community on the Rottulee family soil is 20 percent grasses, 10 percent forbs, and 70 percent shrubs. Among the important plants are birchleaf mountainmahogany, and serviceberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

It is not practical to revegetate large areas of this soil because of the stoniness of the soil. For critical erosion control, small areas can be mechanically treated and seeded. Plants that may be suitable for critical area seedings are those native to the soil and intermediate wheatgrass, orchardgrass, smooth brome, ladak alfalfa, Lewis flax, small burnet, and yellow sweetclover.

This map unit is in capability subclass VIe, nonirrigated. The Trag soil is in the Mountain Loam (Saline Wildrye) range site. The Beje soil is in the Mountain Shallow Loam (Mountain Big Sagebrush) range site. The Rottulee family soil is in the Mountain Stony Loam (Browse) range site.

117—Trag-Beje-Senchert complex. This map unit is on north aspects of plateaus in the Emma Park. Slopes are 3 to 30 percent, 300 to 400 feet long, and convex. Elevation is 7,200 to 8,500 feet.

This unit is 45 percent Trag clay loam, 3 to 30 percent slopes; 15 percent Beje loam, 3 to 15 percent slopes; and 15 percent Senchert loam, 3 to 15 percent slopes; and 25 percent other soils. The Trag soil is on mountain slopes, the Beje soil is on side slopes adjacent to drainageways, and the Senchert soil is on the sides of drainageways and in draws. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 5 percent Perma family soils that have slopes of 15 to 40 percent and are on spur ridges, 15 percent soils that are similar to the Beje soil but have a layer of calcium carbonate accumulation and are on the sides of drainageways, and small areas of Beje very gravelly fine sandy loam and Silas loam in draws.

The Trag soil is very deep and well drained. It formed in alluvium derived dominantly from shale and sandstone. The present vegetation is mainly mountain big sagebrush, Salina wildrye, and serviceberry. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days. Typically, the surface layer is dark brown clay loam about 5 inches thick. The subsoil is brown and light brown clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown clay loam.

Permeability of the Trag soil is moderate. Available water capacity is about 9.5 to 11.0 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is moderate.

The Beje soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from calcareous sandstone. The present vegetation is mainly Gambel oak, western wheatgrass, snowberry, and mountain big sagebrush. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 38 to 45 degrees F, and the average freeze-free period is 60 to 100 days. Typically, the surface layer is brown loam about 6 inches thick. The subsoil to a depth of 14 inches is brown clay loam over sandstone. Depth to bedrock ranges from 10 to 20 inches.

Permeability of the Beje soil is moderate. Available water capacity is 2 to 3 inches. Water supplying capacity is 4 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 3 to 5 percent. Runoff is medium, and the hazard of water erosion is slight.

The Senchert soil is moderately deep and well drained. It formed in residuum and colluvium derived dominantly from sandstone. The present vegetation is mainly aspen and snowberry. The average annual precipitation is 20 to 22 inches, the average annual air temperature is 37 to 38 degrees F, and the average freeze-free period is 50 to 60 days. Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The upper part of the subsoil is brown loam about 12 inches thick, and the lower part to a depth of 35 inches is brown clay loam over calcareous sandstone. Depth to sandstone ranges from 20 to 40 inches.

Permeability of the Senchert soil is moderate. Available water capacity is about 5 to 6 inches. Water

supplying capacity is 9 to 17 inches. Effective rooting depth is 20 to 40 inches. The organic matter content of the surface layer is 5 to 10 percent. Runoff is medium, and the hazard of water erosion is moderate.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain brome, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this soil for rangeland seeding is good. Plants suitable for seeding include those native to the soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability for grazing is good.

The potential plant community on the Beje soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, mountain big sagebrush, serviceberry, and slender wheatgrass.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. Suitable brush management practices include prescribed burning and chemical spraying.

The suitability of this soil for rangeland seeding is very poor. The main limitations are the shallow soil depth and steepness of slope.

The vegetation on the Senchert soil includes an overstory of aspen with a canopy of 60 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This soil is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. The unit can produce about 40 cubic feet of aspen wood products per acre per year. Limitations for the harvesting of wood products are slight.

The suitability of this soil for grazing is good. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability of this soil for rangeland seeding is poor. The main limitation is competition from aspen.

The map unit is in capability subclass VIIe, nonirrigated. The Trag soil is in the Mountain Loam (Saline Wildrye) range site. The Beje soil is in the Mountain Shallow Loam (Mountain Big Sagebrush) range site. The Senchert soil is in the High Mountain Loam (Aspen) woodland site.

118—Trag-Croydon complex. This map unit is on mountain slopes in the vicinity of Pleasant Valley. Slopes are 30 to 60 percent, 100 to 200 feet long, and concave to convex. Elevation is 7,600 to 9,500 feet.

This unit is 50 percent Trag stony loam, 30 to 60 percent slopes, eroded; 30 percent Croydon loam, 30 to 50 percent slopes; and 20 percent other soils and miscellaneous areas. About 80 percent of the unit has slopes of 30 to 50 percent.

Included in this unit are about 10 percent soils that are similar to the Trag soil but have a thin extremely bouldery loam surface layer, 5 percent Falcon stony sandy loam, and 5 percent Rock outcrop.

The Trag soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone and shale of the Black Hawk Formation. The present vegetation in most areas is mainly mountain big sagebrush, lupine, bitterbrush, and rabbitbrush. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 36 to 40 degrees F, and the average freeze-free period is 60 to 80 days. Typically, the surface layer is dark grayish brown stony loam about 10 inches thick. The subsoil is dark grayish brown clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown and very pale brown clay loam.

Permeability of the Trag soil is moderate. Available water capacity is about 9.0 to 10.5 inches. Water supplying capacity is 10 to 16 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 3 to 5 percent. Runoff is rapid, and the hazard of water erosion is high.

The Croydon soil is deep and well drained. It formed in colluvium and alluvium derived dominantly from sandstone and shale of the Black Hawk Formation. The present vegetation in most areas is mainly quaking aspen, peavine, sneezeweed, Columbia needlegrass, and bluegrasses. The average annual precipitation is 20 to 25 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 40 to 60 days. Typically, the surface layer is dark yellowish brown and yellowish brown loam 16 inches thick. The subsurface layer is very pale brown loam 7 inches thick. The subsoil to a depth of 48 inches is light yellowish brown clay loam over weathered sandstone. Depth to sandstone ranges from 40 to 60 inches or more.

Permeability of the Croydon soil is moderately slow. Available water capacity is about 7 to 9 inches. Water supplying capacity is 16 to 18 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential plant community on the Trag soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are Salina wildrye, bluegrass, mountain big sagebrush, and snowberry.

If the desirable forage plants are mostly depleted, brush management and seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this soil for rangeland seeding is poor because of the steepness of slope. Plants suitable for seeding include those native to the soil and intermediate wheatgrass, smooth brome, regar brome, slender wheatgrass, and alfalfa. The suitability for grazing is good.

The vegetation on the Croydon soil includes an overstory of aspen with a canopy of 40 percent. The understory vegetation is 65 percent grasses, 15 percent forbs, and 20 percent shrubs. Among the important plants are slender wheatgrass, Columbia needlegrass, Thurber fescue, and quaking aspen.

This soil is well suited to the production of aspen. The site index for aspen ranges from 60 to 80. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

The suitability of this soil for grazing is poor because of the steepness of slope. Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, burning can be used to improve the rangeland vegetation.

The suitability of this soil for rangeland seeding is very poor. The main limitation is competition from aspen.

This map unit is in capability subclass VIIe, nonirrigated. The Trag soil is in the Mountain Loam (Saline Wildrye) range site. The Croydon soil is in the High Mountain Loam (Aspen) woodland site.

119—Travessilla sandy loam, 1 to 8 percent slopes. This shallow, well drained soil is on benches and mesas between Helper and Hiawatha. It formed in residuum derived dominantly from sandstone. Slopes are 300 to 400 feet long and are concave to convex. The present vegetation in most areas is mainly pinyon, juniper, Salina wildrye, Indian ricegrass, and birchleaf mountainmahogany. Elevation is 6,000 to 8,700 feet. The average annual precipitation is 12 to 14 inches, the average annual air temperature is 45 to 47 degrees F, and the average freeze-free period is 80 to 120 days.

Typically, the surface layer is brown sandy loam about 3 inches thick. The upper 6 inches of the underlying material is brown loam, and the lower part to a depth of 17 inches is light brown loam over sandstone. Depth to sandstone ranges from 7 to 20 inches.

Included in this unit are about 5 percent Rock outcrop on ridges and 5 percent Chupadera fine sandy loam in concave areas.

Permeability of this Travessilla soil is moderate. Available water capacity is about 2 to 3 inches. Water supplying capacity is 3 to 4 inches. Effective rooting depth is 7 to 20 inches. The organic matter content of the surface layer is 1 to 2 percent. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used as rangeland, woodland, and wildlife habitat.

The potential vegetation on the Travessilla soil includes an overstory of pinyon and Utah juniper with a canopy of 60 percent. The understory vegetation is 15 percent grasses, 10 percent forbs, and 75 percent shrubs. Among the important plants are pinyon, Utah juniper, birchleaf mountainmahogany, Mexican cliffrose, and Salina wildrye.

The site index for pinyon and Utah juniper is 32. Average yield is 4 cords of wood per acre. The potential for the production of posts or Christmas trees is poor.

Limitations for the harvesting of wood products are slight.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If pinyon and Utah juniper are thinned, the desirable plants present can be expected to increase for a short period before the pinyon and Utah juniper revegetate the unit.

The suitability of this unit for rangeland seeding is very poor because of the shallow soil depth. It is not practical to revegetate large areas of rangeland because of the shallow soil depth. For critical erosion control, small areas can be mechanically treated and seeded.

This map unit is in capability subclass VIIs, nonirrigated, and in the Upland Shallow Loam (Pinyon-Utah Juniper) woodland site.

120—Travessilla-Rock outcrop complex. This map unit is on benches and mesas between Spring Glen and Hiawatha. Slopes are 3 to 20 percent. Elevation is 5,600 to 6,200 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

This unit is 70 percent Travessilla fine sandy loam, dry, 3 to 20 percent slopes, eroded; 15 percent Rock outcrop; and 15 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit is about 15 percent Haverdad loam near drainageways.

inches. Depth to sandstone or siltstone ranges from 40 to 60 inches or more.

Permeability of the Uinta family soil is moderately slow. Available water capacity is about 4.5 to 6.0 inches. Water supplying capacity is 9 to 16 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Podo soil is shallow and well drained. It formed in residuum and colluvium derived dominantly from sandstone and shale. Slopes are 300 to 400 feet long and are dominantly convex. The present vegetation is mainly Salina wildrye, rabbitbrush, lambsquarter, and black sagebrush. The average annual precipitation is 16 to 20 inches, the average annual air temperature is 38 to 42 degrees F, and the average freeze-free period is 80 to 100 days. Typically, the surface layer is light brownish gray cobbly loam about 5 inches thick. The underlying layer to a depth of 11 inches is light brownish gray gravelly loam over sandstone. Depth to sandstone ranges from 10 to 20 inches.

Permeability of the Podo soil is moderately rapid. Available water capacity is 1 to 2 inches. Water supplying capacity is 3 to 6 inches. Effective rooting depth is 10 to 20 inches. The organic matter content of the surface layer is 1 to 3 percent. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for wildlife habitat and woodland. A few areas are used as rangeland.

The potential vegetation on the Uinta family soil includes an overstory of Engelmann spruce and subalpine fir with a canopy of 80 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Among the important plants are blueberry, Oregon-grape, sedges, pinegrass, and currant.

This soil is well suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55, and the site index for subalpine fir is 60. The main limitation for producing and harvesting timber is the steepness of slope. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

Trees that are suitable for planting are Engelmann spruce and subalpine fir.

This soil is not grazeable by livestock because of the steepness of slope and low forage production.

The potential plant community on the Podo soil is 60 percent grasses, 15 percent forbs, and 25 percent shrubs. Among the important plants are Salina wildrye, bluegrasses, and snowberry.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments.

The suitability of this soil for rangeland seeding is very poor. The main limitation is the shallow soil depth.

This map unit is in capability subclass VIIe, nonirrigated. The Uinta family soil is in the High Mountain Very Steep Stony Loam (Engelmann Spruce) woodland site. The Podo soil is in the Mountain Shallow Loam (Saline Wildrye) range site.

125—Uinta-Toze families complex. This map unit is on mountain slopes. It is in the Bruin Point area and on the eastern side of Patmos Head. Slopes are 30 to 75 percent, 300 to 400 feet long, and plane to convex. The present vegetation is mainly subalpine fir, aspen, and Douglas-fir. Elevation is 7,800 to 9,600 feet. The average annual precipitation is about 20 to 30 inches, the average annual air temperature is 34 to 38 degrees F, and the average freeze-free period is 40 to 60 days.

This unit is 35 percent Uinta family loam, 40 to 70 percent slopes; 30 percent Toze family fine sandy loam, 35 to 70 percent slopes; and 35 percent other soils. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are about 15 percent soils that are similar to the Uinta family soil but do not have a bleached layer below the surface layer, 15 percent Comodore bouldery loam, and 5 percent Midfork family bouldery loam.

The Uinta family soil is deep and well drained. It formed in colluvium derived dominantly from sandstone and siltstone. About 30 percent of the acreage of this soil has slopes of 40 to 50 percent. Typically, the surface is covered with a mat of leaves, twigs, and needles 1 inch thick. The surface layer is dark grayish brown loam about 3 inches thick. The subsurface layer is light yellowish brown stony sandy loam about 8 inches thick. The subsoil is pale brown and light brownish gray stony clay loam about 31 inches thick. Sandstone is at a depth of 42 inches. Depth to sandstone or siltstone ranges from 40 to 60 inches or more.

Permeability of the Uinta family soil is moderately slow. Available water capacity is about 6.0 to 7.5 inches. Water supplying capacity is 9 to 16 inches. Effective rooting depth is 40 to 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is high.

The Toze family soil is very deep and well drained. It formed in colluvium derived dominantly from sandstone, siltstone, and shale. About 40 percent of the acreage of this soil has slopes of 35 to 50 percent. Typically, the surface is covered with mat of leaves, twigs, and needles about 1 inch thick. The upper 3 inches of the surface layer is dark grayish brown fine sandy loam, and the lower part is dark grayish brown loam and gravelly silt loam 21 inches thick. The next layer is grayish brown gravelly silt loam about 8 inches thick. Below this to a depth of 60 inches or more is pale brown very gravelly fine sandy loam. A layer of calcium carbonate accumulation is at a depth of about 24 inches.

Permeability of the Toze family soil is moderate. Available water capacity is about 6 to 9 inches. Water supplying capacity is 11 to 18 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 5 to 10 percent. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for wildlife habitat and woodland.

The potential vegetation on the soils in this unit includes an overstory of Engelmann spruce and subalpine fir with a canopy of 80 percent. The understory vegetation is 20 percent grasses, 5 percent forbs, and 75 percent shrubs. Among the important plants are blueberry, Oregon-grape, sedges, pinegrass, and currant.

This unit is well suited to the production of Engelmann spruce and subalpine fir. The site index for Engelmann spruce is 55, and the site index for subalpine fir is 60. This unit is severely limited for the harvesting of wood products because of the steepness of slope and the hazard of erosion.

Trees that are suitable for planting are Engelmann spruce and subalpine fir.

This unit is not grazeable by livestock because of the steepness of slope and low forage production.

This map unit is in capability subclass VIIe, nonirrigated, and in the High Mountain Very Steep Stony Loam (Engelmann Spruce) woodland site.

126—Winetti Variant cobbly fine sandy loam, 0 to 8 percent slopes. This very deep, well drained soil is on alluvial fans along the Green River. It formed in alluvium derived dominantly from sedimentary rock. Slopes are 300 to 400 feet long and are plane to slightly convex. The present vegetation is mainly greasewood, cheatgrass, big sagebrush, and alkali sacaton. Elevation is 4,300 to 5,200 feet. The average annual precipitation is about 8 to 10 inches, the average annual air temperature is 47 to 49 degrees F, and the average freeze-free period is 110 to 135 days.

Typically, the surface layer is pale brown cobbly fine sandy loam about 3 inches thick. The upper 15 inches of the underlying material is pale brown sand, sandy loam, and fine sandy loam, the next 35 inches is pale brown extremely gravelly sand, and the lower part to a depth of 60 inches or more is pale brown fine sandy loam.

Included in this unit are about 10 percent Green River silt loam on streambanks and 5 percent Glenberg family very fine sandy loam on streambanks.

Permeability of this Winetti Variant soil is moderately rapid. Available water capacity is about 2 to 3.5 inches. Water supplying capacity is 2 to 4 inches. Effective rooting depth is 60 inches or more. The organic matter content of the surface layer is 1 to 3 percent. Runoff is very slow, and the hazard of water erosion is slight. This soil is subject to flooding during prolonged, high-intensity storms. Channeling and deposition are common along streambanks.

This unit is used as rangeland and wildlife habitat.

The potential plant community on the Winetti soil is 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Among the important plants are basin wildrye, western wheatgrass, basin big sagebrush, and rubber rabbitbrush.

Management practices that maintain or improve the rangeland vegetation include proper grazing use, a planned grazing system, and proper location of water developments. If the desirable forage plants are mostly depleted, brush management and rangeland seeding can be used to improve the rangeland vegetation. Suitable brush management practices include prescribed burning, chemical spraying, and mechanical treatment.

The suitability of this unit for rangeland seeding is good. Plants suitable for seeding include adapted native plants and Russian wildrye, crested wheatgrass, and ladak alfalfa.

This map unit is in capability subclass VIIs, nonirrigated, and in the Loamy Bottom range site.

Prime Farmland

In this section, prime farmland is defined and discussed and the prime farmland soils in this survey area are listed.

Prime farmland is of major importance in providing the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal units of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pastureland, or woodland, or they may be in other uses. They either are used for producing food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 75,500 acres, or nearly 8.5 percent of the part of the survey area that is in Carbon County, and 1,260 acres, or 5.6 percent of the part that is in Emery County, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available. The major irrigated areas are near the towns of Helper, Price, and Wellington. The major crops grown are wheat, corn silage, barley, and alfalfa hay.

The following map units meet the soil requirements for prime farmland when irrigated. The location of each map unit is shown on the detailed soil maps at the back of this publication. Soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

1 Atrac very fine sandy loam, 1 to 6 percent slopes
8 Billings silty clay loam, 1 to 3 percent slopes
41 Green River-Juva Variant complex
50 Haverdad loam, moist, 1 to 5 percent slopes
51 Hernandez family, 1 to 3 percent slopes
53 Hernandez family, moist, 1 to 6 percent slopes
55 Hunting loam, 1 to 3 percent slopes
57 Hunting silty clay loam, 1 to 3 percent slopes
64 Minchey loam, 1 to 3 percent slopes
73 Penoyer Variant loam, 1 to 3 percent slopes
90 Ravola loam, 1 to 3 percent slopes
98 Sagers silty clay loam
107 Shupert-Winetti complex

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*6*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 14 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Taxonomic Units and Their Morphology

In this section, each taxonomic unit in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each unit. A pedon, a small three-dimensional area of soil, that is typical of the unit in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*4*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*6*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each taxonomic unit are described in the section "Detailed Soil Map Units."

Atrac Series

The Atrac series consists of very deep, well drained, moderately permeable soils on benches and fan terraces. These soils formed in alluvium derived dominantly from sandstone and shale. Slope is 1 to 6 percent. Elevation is 6,000 to 7,000 feet. Average annual precipitation is 12 to 14 inches, and average annual air temperature is 45 to 47 degrees F.

These soils are fine-loamy, mixed, mesic Ustollic Camborthids.

Typical pedon of Atrac very fine sandy loam, 1 to 6 percent slopes, about 4.4 miles west of Helper, about

700 feet north and 700 feet east of the southwest corner of sec. 29, T. 13 S., R. 9 E.

A11—0 to 2 inches; yellowish brown (10YR 5/4) very fine sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to weak fine granular; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; neutral (pH 6.6); abrupt smooth boundary.

A12—2 to 4 inches; yellowish brown (10YR 5/4) very fine sandy loam, brown (10YR 4/3) moist; moderate very thick platy structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine pores; neutral (pH 6.6); abrupt smooth boundary.

B21—4 to 8 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium prismatic structure parting to moderate coarse subangular blocky; hard, firm, sticky and plastic; few very fine and fine roots; many very fine pores and few fine and medium pores; neutral (pH 6.6); clear smooth boundary.

B22—8 to 12 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; strong coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; many very fine and few fine pores; neutral (pH 6.6); abrupt smooth boundary.

B23—12 to 20 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; strong medium angular blocky structure; hard, very firm, sticky and slightly plastic; few very fine and fine roots; common very fine and few fine pores; neutral (pH 6.8); abrupt smooth boundary.

C1—20 to 32 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and slightly plastic; common very fine pores; slightly calcareous; veins of calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

C2—32 to 49 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine and few fine pores; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.0); clear smooth boundary.

C3—49 to 60 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine pores; moderately alkaline (pH 8.0).

Bedrock is at a depth of 60 inches or more. The solum is 17 to 26 inches thick.

A horizon: Value is 3 or 4 when moist, and chroma is 3 or 4.

B2 horizon: Value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 4 to 6. Clay content is 20 to 26 percent.

C horizon: Value is 6 or 7 when dry and 4 to 6 moist, and chroma is 2 to 4. Clay content is 18 to 26 percent. Rock fragment content is 0 to 15 percent, of which 0 to 15 percent is pebbles and 0 to 5 percent is cobbles and stones. Calcium carbonate equivalent is 0 to 15 percent. Reaction is moderately alkaline or strongly alkaline.

Beje Series

The Beje series consists of shallow, well drained, moderately permeable soils on plateaus, mountain slopes, ridges, and benches. These soils formed in residuum and colluvium derived dominantly from sandstone and shale. Slope is 1 to 50 percent. Elevation is 6,800 to 9,700 feet. Average annual precipitation is 14 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy, mixed Lithic Argiborolls.

Typical pedon of a Beje loam in an area of Beje-Comodore complex, about 12 miles northeast of Price, about 1,000 feet west and 1,500 feet south of the northeast corner of sec. 19, T. 13 S., R. 12 E.

A1—0 to 6 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium pores; mildly alkaline (pH 7.6); abrupt smooth boundary.

B2t—6 to 14 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common very fine, fine, and medium roots; common very fine and fine pores; few thin clay films on faces of peds; mildly alkaline (pH 7.6); abrupt smooth boundary.

R—14 inches; sandstone.

Depth to bedrock and thickness of the solum are 10 to 20 inches. The mollic epipedon is 8 to 14 inches thick. The control section is 0 to 35 percent rock fragments.

A horizon: Hue is 10YR or 7.5YR, value is 3 or 4 when dry and 2 or 3 when moist, and chroma is 2 or 3. Texture is loam, very fine sandy loam, fine sandy loam, very gravelly fine sandy loam, and cobbly fine sandy loam. Reaction is neutral to moderately alkaline.

B horizon: Hue is 7.5YR or 10YR, value is 3 or 4 when dry, and chroma is 2 to 4. Texture is clay loam, loam, cobbly loam, sandy clay loam, gravelly sandy clay loam, or cobbly sandy clay loam. Clay content is 18 to 35 percent. Reaction is mildly alkaline or moderately alkaline.

C horizon: This horizon, where present, is a thin layer of slightly calcareous fine sandy loam.

Billings Series

The Billings series consists of very deep, well drained, slowly permeable soils on alluvial fans, flood plains, and narrow alluvial valley floors. These soils formed in alluvium derived dominantly from alkaline gypsiferous marine shale and mixed sedimentary rocks. Slope is 0 to 6 percent. Elevation is 5,200 to 5,700 feet. Average annual precipitation is 6 to 8 inches, and average annual air temperature is 48 to 50 degrees F.

These soils are fine-silty, mixed (calcareous), mesic Typic Torrifluvents.

Typical pedon of Billings silty clay loam, 1 to 3 percent slopes, about 1.5 miles east of Huntington, Utah, about 600 feet north and 2,000 feet west of the southeast corner of sec. 20, T. 17 S., R. 9 E.

Ap1—0 to 3 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure; hard, firm, sticky and plastic; many medium roots; common medium pores; strongly calcareous; moderately alkaline (pH 7.9); clear smooth boundary.

Ap2—3 to 11 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; many medium roots; common fine pores; strongly calcareous; moderately alkaline (pH 8.0); clear smooth boundary.

C1—11 to 18 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; mildly alkaline (pH 7.8); gradual wavy boundary.

C2—18 to 42 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few fine pores; strongly calcareous; mildly alkaline (pH 7.6); diffuse wavy boundary.

C3sa—42 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; few fine pores; few fine grayish brown (10YR 6/2) soft gypsum nodules; strongly saline; strongly calcareous; moderately alkaline (pH 8.0).

A1 or Ap horizon: Hue is 2.5Y or 5Y, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 2 to 4.

C horizon: Hue is 2.5Y or 5Y, value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 2 to 4. Clay content is 27 to 35 percent. In the lower part, gypsum content is 0.5 to 10.0 percent. Calcium carbonate equivalent is 5 to 25 percent. This horizon is slightly saline to very strongly saline and is mildly alkaline to very strongly alkaline.

Brycan Series

The Brycan series consists of very deep, well drained, moderately slowly permeable soils on alluvial fans and in valleys. These soils formed in alluvium derived from shale and sandstone. Slope is 3 to 8 percent. Elevation is 7,700 to 8,600 feet. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are fine-loamy, mixed Cumulic Haploborolls.

Typical pedon of a Brycan loam in an area of Silas-Brycan loams, about 2.5 miles north of the town of Scofield, about 2,500 feet south and 2,500 feet west of the northeast corner of sec. 21, T. 12 S., R. 7 E.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium platy structure parting to weak fine granular; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; mildly alkaline (pH 7.6); abrupt smooth boundary.

A12—4 to 12 inches; brown (10YR 4/3) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and fine pores; mildly alkaline (pH 7.6); clear smooth boundary.

B21—12 to 24 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; moderately alkaline (pH 7.6); clear smooth boundary.

B22—24 to 32 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and slightly plastic; few very fine and common fine roots; common very fine and fine pores; mildly alkaline (pH 7.8); clear smooth boundary.

C1—32 to 42 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine pores; mildly alkaline (pH 7.8); abrupt smooth boundary.

C2ca—42 to 60 inches; brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine pores; slightly calcareous; splotches of calcium carbonate; moderately alkaline (pH 8.2).

The profile is mildly alkaline or moderately alkaline.

A horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 horizon: Value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4.

C horizon: Value is 4 to 6 when dry and 3 or 4 when moist, and chroma is 3 or 4.

Cabba Family

The Cabba family consists of shallow, well drained, moderately permeable soils on benches, canyon rims, and steep canyonsides. These soils formed in residuum and colluvium derived dominantly from shale or siltstone of the Green River Formation. Slope is 3 to 70 percent. Elevation is 5,000 to 8,200 feet. Average annual precipitation ranges from 12 to 16 inches, and average annual air temperature ranges from 42 to 45 degrees F.

These soils are loamy, mixed (calcareous), frigid, shallow Typic Ustorthents.

Reference pedon of a Cabba family bouldery loam in an area of Cabba family-Guben-Rock outcrop complex, on the slopes of Cottonwood Ridge, about 250 feet west and 1,500 feet north of the southeast corner of sec. 7, T. 13 S., R. 16 E.

A1—0 to 3 inches; pale brown (10YR 6/3) bouldery loam, brown (10YR 4/3) moist; moderate medium granular structure parting to moderate fine granular; loose, slightly sticky and slightly plastic; common very fine and fine roots; 5 percent pebbles, 10 percent cobbles, and 15 percent boulders; slightly calcareous; disseminated calcium carbonate; mildly alkaline (pH 7.8); abrupt smooth boundary.

C1—3 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak fine granular structure; loose, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcareous; mildly alkaline (pH 7.8); abrupt smooth boundary.

C2—7 to 15 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly calcareous; moderately alkaline (pH 8.3); abrupt smooth boundary.

C3r—15 inches; rippable shale; soft carbonate coatings on surface of rock.

Paralithic contact is at a depth of 8 to 20 inches.

A horizon: Hue is 10YR or 5Y, and value is 4 or 5 when moist. Texture is gravelly loam, bouldery loam, or extremely channery loam.

C horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry, and chroma is 2 to 4. Texture is loam, gravelly loam, or clay loam. Clay content is 20 to 35 percent. Rock fragment content is 0 to 30 percent.

Casmos Series

The Casmos series consists of shallow, well drained, moderately permeable soils on summits, pediment slopes, and canyonsides. These soils formed in residuum and colluvium derived from siltstone and shale from the Green River Formation. Slope is 2 to 70 percent. Elevation is 4,700 to 6,000 feet. Average annual precipitation is 6 to 8 inches, and average annual air temperature is 48 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Torriorthents.

Typical pedon of a Casmos channery loam in an area of Casmos-Rock outcrop complex, 2 to 25 percent slopes, about 0.25 mile northwest of Horse Bench, about 1,500 feet south and 100 feet west of the northeast corner of sec. 8, T. 12 S., R. 17 E.

A1—0 to 2 inches; pale brown (10YR 6/3) channery loam, brown (10YR 5/3) moist; weak fine granular structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; few very fine pores; 15 percent channers and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1—2 to 6 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak medium subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine and fine roots; few very fine pores; 10 percent channers; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear wavy boundary.

R—6 inches; hard siltstone.

Bedrock is at a depth of 5 to 13 inches.

A horizon: Reaction is moderately alkaline or strongly alkaline.

Chipeta Series

The Chipeta series consists of shallow, well drained, slowly permeable soils on hills. These soils formed in residuum derived from shale. Slope is 1 to 20 percent. Elevation is 5,300 to 6,300 feet. Average annual precipitation is 6 to 8 inches, and average annual air temperature is 48 to 50 degrees F.

These soils are clayey, mixed (calcareous), mesic, shallow Typic Torriorthents.

Typical pedon of a Chipeta silty clay loam in an area of Chipeta-Badland complex, about 2.5 miles northwest of Wattis-Hiawatha Junction, about 1,750 feet south and 500 feet east of the northwest corner of sec. 21, T. 15 S., R. 9 E.

A1—0 to 2 inches; gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; weak medium platy structure parting to weak very fine granular; hard, firm, sticky

and plastic; few very fine, fine, and medium roots; strongly calcareous; moderately alkaline (pH 8.0); abrupt smooth boundary.

C1—2 to 12 inches; gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; weak medium subangular blocky structure; very hard, very firm, sticky and very plastic; few very fine, fine, and medium roots; few fine pores; strongly calcareous; strongly alkaline (pH 8.8); clear smooth boundary.

C2cs—12 to 17 inches; gray (10YR 6/1) silty clay loam, dark gray (10YR 4/1) moist; moderate fine angular blocky structure; very hard, very firm, sticky and very plastic; few very fine and fine roots; few fine pores; 20 percent shale fragments; common gypsum flecks; strongly calcareous; strongly alkaline (pH 8.8); clear smooth boundary.

Cr—17 inches; weathered shale.

Paralithic contact is at a depth of 10 to 20 inches. Conductivity of the saturation extract is 8 to 16 millimhos.

A horizon: Hue is 10YR or 2.5Y, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 1 or 2.

C horizon: Hue is 10YR or 2.5Y, and chroma is 1 or 2. Texture is silty clay loam or silty clay. Gypsum ranges from 0.5 to 10.0 percent.

Chupadera Series

The Chupadera series consists of moderately deep, well drained, moderately rapidly permeable soils on benches and terraces. These soils formed in alluvium and residuum derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 5,900 to 7,400 feet. Average annual precipitation is 12 to 14 inches, and average annual air temperature is 45 to 47 degrees F.

These soils are coarse-loamy, mixed, mesic Ustollic Calciorthids.

Typical pedon of Chupadera fine sandy loam, 1 to 8 percent slopes, about 2 miles west of Porphyry Bench, about 500 feet north and 100 feet east of the southwest corner of sec. 1, T. 14 S., R. 8 E.

A1—0 to 6 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; weak medium platy structure; soft, friable; few very fine and fine roots; few very fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); abrupt smooth boundary.

AC—6 to 16 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; moderate medium subangular structure; hard, friable; few very fine, fine, and medium roots; few very fine and fine pores; strongly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.0); clear smooth boundary.

Cca—16 to 28 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; single grain; loose; few very fine and fine roots; strongly calcareous; splotches of calcium carbonate; moderately alkaline (pH 8.4); abrupt smooth boundary.

R—28 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches.

A horizon: Value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4.

AC horizon: Value is 5 or 6 when dry, and chroma is 3 or 4. Clay content is 14 to 17 percent.

Cca horizon: Value is 6 or 7 when dry and 4 to 6 when moist, and chroma is 3 or 4. Clay content is 14 to 17 percent. Calcium carbonate equivalent is 15 to 32 percent.

Comodore Series

The Comodore series consists of shallow, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Lithic Haploborolls.

Typical pedon of a Comodore very stony fine sandy loam in an area of Comodore-Datino Variant complex; about 12 miles east of Price, near Dugout Creek; about 2,300 feet north and 2,000 feet east of the southwest corner of sec. 23, T. 13 S., R. 12 E.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) very stony fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 20 percent stones; mildly alkaline (pH 7.4); clear smooth boundary.

C1—6 to 14 inches; very dark grayish brown (10YR 3/2) very stony loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 15 percent cobbles, and 15 percent stones; mildly alkaline (pH 7.4); abrupt wavy boundary.

R—14 inches; fractured sandstone.

Bedrock is at a depth of 10 to 20 inches. The control section is 35 to 45 percent rock fragments.

A horizon: Value is 2 or 3 when moist, and chroma is 2 or 3. Texture is very stony fine sandy loam or bouldery loam.

C horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 or 3. Clay content is 19 to 24 percent. The horizon is 15 to 20 percent pebbles, 10 to 15 percent cobbles, and 15 to 20 percent stones.

Croydon Series

The Croydon series consists of deep, well drained, moderately slowly permeable soils on foot slopes and mountain slopes. These soils formed in alluvium and colluvium derived dominantly from sandstone and shale. Slope is 8 to 50 percent. Elevation is 7,600 to 9,500 feet. Average annual precipitation is 20 to 25 inches, and average annual air temperature is 34 to 38 degrees F.

These soils are fine-loamy, mixed Argic Cryoborolls.

Typical pedon of Croydon loam, 8 to 30 percent slopes, about 1.2 miles southwest of Scofield, about 500 feet north and 50 feet west of the southeast corner of sec. 6, T. 13 S., R. 7 E.

A11—0 to 5 inches; dark yellowish brown (10YR 4/4) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable, slightly plastic; many very fine, fine, and medium roots and few coarse roots; slightly acid (pH 6.5); clear smooth boundary.

A12—5 to 16 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to moderate medium granular; soft, very friable, slightly plastic; many very fine, fine, and medium roots and few coarse roots; slightly acid (pH 6.4); abrupt smooth boundary.

A2—16 to 23 inches; very pale brown (10YR 7/4) loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; 10 percent pebbles; slightly acid (pH 6.4); abrupt wavy boundary.

B21t—23 to 33 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few very fine, fine, and medium roots; common very fine pores; few moderately thick clay films on faces of peds and in pores; small pockets of soil material similar to that in the A2 horizon; 5 percent pebbles and 5 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

B22t—33 to 48 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine roots; common very fine pores; many moderately thick clay films on faces of peds; 10 percent pebbles; slightly acid (pH 6.4); abrupt smooth boundary.

R—48 inches; weathered sandstone.

Bedrock is at a depth of 40 to 60 inches. The solum is 40 to 60 inches thick.

A1 horizon: Value is 3 to 5 when dry and 2 or 3 when moist, and chroma is 2 to 4 when dry and 2 or 3 when moist.

A2 horizon: Value is 7 or 8 when dry and 5 or 6 when moist, and chroma is 2 to 4. Rock fragment content is 5 to 15 percent. The horizon is 5 to 15 percent pebbles and 0 to 5 percent cobbles.

B2 horizon: Hue is 5Y or 10YR, value is 6 or 7 when dry and 4 to 6 when moist, and chroma is 2 to 4 when dry. Clay content is 27 to 34 percent. Rock fragment content is 5 to 15 percent. The horizon is 0 to 15 percent pebbles, 0 to 5 percent cobbles, and 0 to 5 percent stones.

Curecanti Family

The Curecanti family consists of very deep, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 50 to 70 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Argiborolls.

Reference pedon of a Curecanti family loam in an area of Curecanti family-Pathead complex, about 7 miles west and 3 miles north of Helper, 200 feet south and 700 feet east of the northwest corner of sec. 12, T. 13 S., R. 8 E.

A11—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; 10 percent pebbles; neutral (pH 6.6); clear wavy boundary.

A12—7 to 15 inches; brown (10YR 5/3) very stony loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, very firm, sticky and slightly plastic; few very fine and fine roots and common medium and coarse roots; few very fine pores; 15 percent pebbles, 10 percent cobbles, and 30 percent stones; neutral (pH 6.6); clear wavy boundary.

A2—15 to 20 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) moist; moderate coarse subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots and common medium and coarse roots; many very fine and few fine pores; 20 percent pebbles, 5 percent cobbles, and 30 percent stones; slightly acid (pH 6.4); clear wavy boundary.

B21t—20 to 27 inches; pale brown (10YR 6/3) very stony loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure;

slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium roots; common very fine pores; few thin and moderately thick clay films on ped faces and in pores; 10 percent pebbles, 15 percent cobbles, and 30 percent stones; neutral (pH 6.6); clear wavy boundary.

B22t—27 to 60 inches; pale brown (10YR 6/3) very stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots and common medium roots; common very fine pores; common thin and moderately thick clay films on ped faces and in pores; 10 percent pebbles, 15 percent cobbles, and 30 percent stone; slightly acid (pH 6.4).

The solum is 40 to 60 inches thick. The mollic epipedon is 12 to 15 inches thick.

A1 horizon: Value is 3 to 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

A2 horizon: Value is 5 to 7 when dry and 3 to 5 when moist, and chroma is 2 or 3.

B2t horizon: Value is 4 or 5 when moist, and chroma is 2 to 4. Clay content is 18 to 27 percent.

Datino Series

The Datino Series consists of very deep, well drained, moderately permeable soils on canyonsides and mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 6,800 to 8,700 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of a Datino extremely stony fine sandy loam in an area of Perma family-Datino complex, about 0.25 mile south of Soldier Creek Mine, 2,400 feet west and 2,200 feet south of the northeast corner of sec. 18, T. 13 S., R. 12 E.

A1—0 to 10 inches; brown (10YR 4/3) extremely stony fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; few very fine pores; 15 percent pebbles, 25 percent cobbles, and 25 percent stones; moderately alkaline (pH 7.9); clear smooth boundary.

B2—10 to 16 inches; brown (10YR 5/3) very stony loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores and few medium pores; 15 percent pebbles, 15 percent cobbles, and 10 percent stones; slightly calcareous; moderately alkaline (pH 7.9); gradual wavy boundary.

Clca—16 to 41 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; common very fine and fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones; strongly calcareous; soft powdery masses of calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.

C2—41 to 60 inches; pale brown (10YR 6/3) very stony fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; few very fine pores; 15 percent pebbles, 20 percent cobbles, and 25 percent stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 7.9).

Secondary calcium carbonate is at a depth of 15 to 22 inches. The mollic epipedon is 10 to 15 inches thick. The solum is 15 to 22 inches thick. The particle-size control section is 35 to 60 percent rock fragments.

A horizon: Value is 4 or 5 when dry and 2 or 3 when moist, and chroma is 2 or 3.

B2 horizon: Value is 3 to 5 when dry and 2 to 4 when moist, and chroma is 2 or 3. Clay content is 18 to 26 percent. Rock fragment content is 35 to 45 percent. Reaction is mildly alkaline or moderately alkaline.

C horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Clay content is 16 to 25 percent. Rock fragment content is 40 to 70 percent. Reaction is mildly alkaline or moderately alkaline.

Datino Variant

The Datino Variant consists of very deep, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 6,800 to 9,000 feet. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy-skeletal, mixed Typic Haploborolls.

Typical pedon of Datino Variant very stony loam, 50 to 80 percent slopes, 3,500 feet southeast of Valley Mountain, at the head of Trail Canyon (No general land office survey made.)

A—0 to 4 inches; very dark grayish brown (10YR 3/2) very stony loam, very dark brown (10YR 2/2) moist; strong fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; 5

percent pebbles; mildly alkaline (pH 7.6); abrupt smooth boundary.

B21—4 to 14 inches; very dark grayish brown (10YR 3/2) very cobbly loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots and common medium roots; few very fine pores; 15 percent pebbles and 25 percent cobbles; mildly alkaline (pH 7.6); abrupt smooth boundary.

B3ca—14 to 22 inches; grayish brown (10YR 5/2) very cobbly loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots and few fine and medium roots; few very fine pores; 20 percent pebbles and 20 percent cobbles; moderately calcareous; mildly alkaline; (pH 7.8); clear smooth boundary.

IICca—22 to 60 inches; grayish brown (10YR 5/2) very stony fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few fine, medium, and coarse roots; 30 percent pebbles, 10 percent cobbles, and 20 percent stones; moderately calcareous; mildly alkaline (pH 7.8).

The mollic epipedon is 10 to 15 inches thick. The solum is 15 to 22 inches thick. The particle-size control section is 18 to 27 percent clay and 35 to 60 percent rock fragments.

Doney Family

The Doney family consists of moderately deep, well drained, moderately permeable soils on benches, foot slopes, and mountain slopes. These soils formed in residuum and colluvium derived dominantly from siltstone, shale, and sandstone. Slope is 3 to 70 percent. Elevation is 6,700 to 9,500 feet. Average annual precipitation ranges from 14 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

These soils are fine-loamy, mixed, frigid Typic Ustochrepts.

Reference pedon of a Doney family stony loam in an area of Rabbitex-Doney family-Midfork family complex, about 7.5 miles northwest of Helper, 800 feet south and 1,800 feet east of the northwest corner of sec. 19, T. 12 S., R. 9 E.

A1—0 to 4 inches; brown (10YR 5/3) stony loam, dark brown (10YR 3/3) moist; weak medium platy structure parting to moderate medium granular; soft, friable; common very fine and fine roots; few very fine pores; 10 percent pebbles, 5 percent cobbles, and 5 percent stones; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); abrupt smooth boundary.

B21—4 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and common fine roots; few very fine pores; 5 percent pebbles and 5 percent cobbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); gradual smooth boundary.

B22—11 to 15 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; 10 percent pebbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); gradual smooth boundary.

C1—15 to 24 inches; light gray (2.5Y 7/2) loam, light olive brown (2.5Y 5/4) moist; massive; loose, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine pores; 10 percent pebbles; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2—24 to 35 inches; light gray (2.5Y 7/2) loam, light olive brown (2.5Y 5/4) moist; massive; loose, very friable, slightly sticky; few fine roots; few very fine pores; 15 percent pebbles; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0); gradual smooth boundary.

C3r—35 inches; weathered shale.

Paralithic contact is at a depth of 20 to 40 inches. The particle-size control section is 0 to 15 percent rock fragments.

A1 horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry, and chroma is 2 or 3. Texture is gravelly sandy loam, silt loam, and stony loam. Clay content is 15 to 22 percent.

B horizon: Hue is 10YR or 2.5Y, value is 5 to 7 when dry and 4 to 6 when moist, and chroma is 2 or 3. Texture is loam or clay loam. Clay content is 18 to 30 percent.

C horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 5 or 6 when moist, and chroma is 2 or 3. Texture is loam or clay loam.

Falcon Series

The Falcon series consists of shallow, well drained, rapidly permeable soils on hillslopes and summits. These soils formed in residuum derived from sandstone. Slope is 8 to 50 percent. Elevation is 7,600 to 8,200 feet. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 37 to 40 degrees F.

These soils are loamy, mixed Lithic Haploborolls.

Typical pedon of a Falcon stony sandy loam in an area of Falcon-Rock outcrop complex, about 4 miles north of the town of Scofield, about 650 feet north and

sandstone and shale. Slope is 3 to 6 percent. Elevation is 5,400 to 5,800 feet. Average annual precipitation is 6 to 8 inches, and average annual air temperature is 48 to 50 degrees F.

These soils are coarse-loamy, mixed, mesic Typic Calciorthids.

Typical pedon of Moffat fine sandy loam, 3 to 6 percent slopes, about 1,800 feet north and 2,400 feet east of the southwest corner of sec. 23, T. 15 S., R. 12 E.

A1—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, friable; few fine and medium roots; many very fine, common fine, and few medium pores; moderately calcareous; moderately alkaline (pH 8.4); abrupt smooth boundary.

B2—2 to 9 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, friable; few fine and medium roots; many very fine, common fine, and few medium pores; moderately calcareous; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1ca—9 to 21 inches; pink (7.5YR 7/4) fine sandy loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; hard, firm; few very fine, fine, and medium roots; many very fine and common fine pores; strongly calcareous; coatings of calcium carbonate on faces of peds; strongly alkaline (pH 8.8); clear smooth boundary

C2ca—21 to 29 inches; pinkish white (7.5YR 8/2) fine sandy loam, pink (7.5YR 7/4) moist; moderate medium subangular blocky structure; hard, firm; few very fine and fine roots; common very fine and few fine pores; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0); gradual wavy boundary.

C3—29 to 60 inches; pink (7.5YR 8/4) fine sandy loam, light brown (7.5YR 6/4) moist; massive; very hard, very firm; few very fine and fine roots; common very fine and few fine pores; 5 percent pebbles and 5 percent cobbles; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 9.0).

Secondary calcium carbonate is at a depth of 9 to 15 inches.

Cca horizon: Value is 6 to 8 when dry and 5 to 7 when moist, and chroma is 2 to 4. Calcium carbonate equivalent is 20 to 35 percent.

Nelman Series

The Nelman series consists of moderately deep, well drained, moderately rapidly permeable soils on benches and canyonsides. These soils formed in residuum derived dominantly from sandstone and shale. Slope is 15 to 50 percent. Elevation is 6,400 to 7,200 feet. Average annual precipitation ranges from 12 to 14 inches, and average annual air temperature ranges from 45 to 47 degrees F.

These soils are coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents.

Typical pedon of a Nelman very gravelly loam in an area of Nelman-Travessilla-Rock outcrop complex, about 9 miles west of Price, 2,000 feet south and 250 feet east of the northwest corner of sec. 24, T. 14 S. R. 8 E.

A1—0 to 4 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak fine granular structure; hard, friable, slightly sticky; common very fine and fine roots; 30 percent pebbles, 5 percent cobbles, and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1—4 to 10 inches; very pale brown (10YR 7/3) fine sandy loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; very hard, friable; few very fine, fine, and medium roots; few very fine and fine pores; 5 percent pebbles, 2 percent cobbles, and 2 percent stones; moderately calcareous; fine veins of calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2—10 to 27 inches; very pale brown (10YR 7/3) fine sandy loam, pale brown (10YR 6/3) moist; moderate medium subangular blocky structure; hard, friable, slightly plastic; few very fine, fine, and medium roots; few very fine and fine pores; 5 percent pebbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

R—27 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches.

A horizon: Value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 3 or 4. Reaction is moderately alkaline or strongly alkaline.

C horizon: Hue is 7.5YR or 10YR, value is 5 to 7 when dry and 4 to 7 when moist, and chroma is 2 to 4. Clay content is 10 to 15 percent. Reaction is moderately alkaline or strongly alkaline.

Pathead Series

The Pathead series consists of moderately deep, well drained, moderately permeable soils on benches, ridges, canyonsides, and mountain slopes. These soils formed in colluvium and residuum derived dominantly from sandstone and shale. Slope is 15 to 70 percent. Elevation is 5,900 to 9,000 feet. Average annual precipitation is 14 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Pathead extremely stony loam in an area of Pathead-Curecanti family association, about 2 miles north and 4 miles west of Helper, about 1,100 feet north and 400 feet west of the southeast corner of sec. 6, T. 13 S., R. 9 E.

A1—0 to 3 inches; brown (10YR 5/3) extremely stony loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; few very fine pores; 5 percent pebbles, 15 percent cobbles, 40 percent stones, and 5 percent boulders; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); abrupt smooth boundary.

C1—3 to 14 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots and few fine and medium roots; many very fine pores; 20 percent pebbles and 5 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

C2—14 to 26 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine pores; 20 percent pebbles, 25 percent cobbles, and 5 percent stones; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); clear smooth boundary.

R—26 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches. The particle-size control section is 35 to 60 percent rock fragments.

A horizon: Value is 5 or 6 when dry and 3 to 5 when moist, and chroma is 2 or 3. Texture is gravelly loam, cobbly loam, extremely stony fine sandy loam, extremely stony loam, or extremely bouldery fine sandy loam. Reaction is moderately alkaline or strongly alkaline.

C horizon: Hue is 10YR or 2.5Y, value is 6 or 7 when dry and 3 to 5 when moist, and chroma is 2 to 4. Texture is very cobbly loam, extremely cobbly loam, or very stony fine sandy loam. Clay content is 18 to 27 percent. Calcium carbonate equivalent is 11 to 28 percent. Reaction is moderately alkaline or strongly alkaline.

Penoyer Variant

The Penoyer Variant consists of very deep, well drained, moderately permeable soils on alluvial fans and valley floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 6 percent. Elevation is 5,400 to 6,000 feet. Average annual precipitation is 6 to 8 inches, and average annual air temperature 48 to 50 degrees F.

These soils are coarse-silty, mixed (calcareous), mesic Typic Torriorthents.

Typical pedon of Penoyer Variant loam, 1 to 3 percent slopes, about 650 feet north and 100 feet west of the southeast corner of sec. 3, T. 15 S., R. 11 E.

Ap1—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; common medium roots; many fine and few coarse pores; strongly calcareous; mildly alkaline (pH 7.7); clear smooth boundary.

Ap2—4 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common medium roots; few fine and coarse pores; strongly calcareous; mildly alkaline (pH 7.7); clear smooth boundary.

C1—9 to 23 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse angular blocky structure parting to weak medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; many fine and few medium roots; strongly calcareous; moderately alkaline (pH 7.9); gradual wavy boundary.

C2—23 to 41 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; few fine roots; common fine discontinuous pores; moderately calcareous; moderately alkaline (pH 8.0); gradual wavy boundary.

C3—41 to 60 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; few fine roots; few fine pores; strongly calcareous; moderately alkaline (pH 8.2).

Calcium carbonate equivalent of the profile is 5 to 25 percent. Reaction is mildly alkaline or moderately alkaline.

A horizon: Value is 6 or 7 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C horizon: Clay content is 13 to 18 percent.

Perma Family

The Perma family consists of very deep, well drained, moderately rapidly permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and shale. Slope is 15 to 80 percent. Elevation is 7,200 to 8,800 feet. Average annual precipitation ranges from 16 to 20 inches, and average annual air temperature ranges from 38 to 45 degrees F.

common fine distinct yellowish brown (10YR 5/4) and common fine faint gray (N 5/0) mottles; weak fine angular blocky structure; very hard, very firm, very sticky and very plastic; few fine roots; common medium pores; very strongly saline; efflorescent salt on many ped faces and in pores; strongly calcareous; strongly alkaline (pH 8.5); gradual wavy boundary.

C3sa—14 to 32 inches; light brownish gray (2.5Y 6/2) heavy silt loam, grayish brown (2.5Y 5/2) moist; many fine distinct yellowish brown (10YR 5/4) mottles and common fine faint gray (N 5/0) mottles; massive; very hard, firm, sticky and plastic; few fine roots; common fine and medium pores; very strongly saline; efflorescent salt on many ped faces and in pores; strongly calcareous; strongly alkaline (pH 8.5); gradual wavy boundary.

C4sa—32 to 60 inches; light gray (2.5Y 7/2) heavy silt loam, grayish brown (2.5Y 5/2) moist; few fine distinct yellowish brown (10YR 5/4) and medium faint gray (N 5/0) mottles; massive; hard, firm, sticky and plastic; few fine roots; common fine pores; strongly calcareous; strongly alkaline (pH 8.5).

The percentage of exchangeable sodium in the profile is 15 to 70.

A horizon: Hue is 2.5Y or 5Y, value is 4 to 6 when moist and 5 to 7 when dry, and chroma is 1 or 2.

C horizon: Texture is silty clay loam or silt loam.

Senchert Series

The Senchert series consists of moderately deep, well drained, moderately permeable and moderately slowly permeable soils on mountain slopes, benches, and ridges of plateaus. These soils formed in residuum, colluvium, and alluvium derived dominantly from shale or sandstone. Slope is 1 to 50 percent. Elevation is 7,200 to 10,100 feet. Average annual precipitation is 20 to 30 inches, and average annual air temperature is 36 to 38 degrees F.

These soils are fine-loamy, mixed Argic Pachic Cryoborolls.

Typical pedon of Senchert loam, 3 to 15 percent slopes, about 10 miles north and 2 miles west of East Carbon City, about 1,000 feet north and 300 feet west of the southeast corner of sec. 32, T. 15 S., R. 16 E.

O1—3 inches to 0; partly decomposed leaves and twigs.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; soft, very friable; few very fine and fine roots; neutral (pH 7.2); abrupt smooth boundary.

B21t—4 to 9 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; few very fine and fine pores; few thin clay films on ped faces and in pores; neutral (pH 7.2); clear smooth boundary.

B22t—9 to 16 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine, fine, and medium roots; few very fine and fine pores; common moderately thick clay films on ped faces and in pores; mildly alkaline (pH 7.6); clear smooth boundary.

B23t—16 to 35 inches; brown (10YR 5/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine and fine pores; few thin clay films on ped faces and in pores; mildlv alkaline (pH 7.6); abrupt smooth boundary.

R—35 inches; calcareous sandstone.

Bedrock is at a depth of 20 to 40 inches. The mollic epipedon and solum are 18 to 35 inches thick.

A horizon: Value is 3 to 5 when dry and 2 or 3 when moist, and chroma is 2 or 3. Texture is loam, very fine sandy loam, or fine sandy loam.

B2t horizon: Value is 4 or 5 when dry, and chroma is 2 or 3. Texture is loam or clay loam. Clay content is 24 to 35 percent. Reaction is neutral or mildly alkaline.

C horizon (where present): Texture is clay loam or silty clay. This horizon is 0 to 7 inches thick.

Senchert Family

The Senchert family consists of moderately deep, well drained, moderately permeable soils on mountain slopes, plateaus, and ridges. These soils formed in residuum and alluvium derived dominantly from sandstone and shale. Slope is 1 to 50 percent. Elevation is 8,000 to 10,100 feet. Average annual precipitation is 20 to 30 inches, and average annual air temperature is 36 to 38 degrees F.

These soils are fine-loamy, mixed Argic Pachic Cryoborolls.

Reference pedon of Senchert family, 3 to 15 percent slopes, about 150 feet south and 1,000 feet east of the northwest corner of sec. 10, T. 16 S., R. 16 E.

A11—0 to 1 inch; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; common very fine and fine roots; neutral (pH 7.2); abrupt smooth boundary.

A12—1 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly plastic; many very fine and fine roots; common very fine and fine pores; neutral (pH 7.2); clear smooth boundary.

A13—11 to 23 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; hard, friable; slightly sticky and slightly plastic; common very fine and fine roots; many fine pores; mildly alkaline (pH 7.4); clear smooth boundary.

B2t—23 to 35 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine pores; mildly alkaline (pH 7.4); clear smooth boundary.

R—35 inches; sandstone.

Bedrock is at a depth of 20 to 40 inches. Clay content in the particle-size control section ranges from 18 to 35 percent.

Sheepcan Series

The Sheepcan series consists of very deep, well drained, moderately slowly permeable soils on mountain slopes. These soils formed in colluvium derived from sandstone, shale, and siltstone of the Green River Formation. Slope is 40 to 70 percent. Elevation is 7,000 to 8,500 feet. Average annual precipitation is 15 to 18 inches, and average annual air temperature is 37 to 45 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustorthents.

Typical pedon of a Sheepcan stony loam in an area of Sheepcan-Podo-Rock outcrop complex, about 20 miles north of Wellington, about 1,500 feet east and 1,700 feet south of the northwest corner of sec. 4, T. 12 S., R. 12 E.

A1—0 to 9 inches; light brownish gray (10YR 6/2) stony loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; few very fine and many fine random tubular pores; 10 percent pebbles, 10 percent cobbles, and 10 percent stones; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

C1—9 to 18 inches; light gray (10YR 7/2) gravelly clay loam, pale brown (10YR 6/3) moist; moderate medium and fine subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and few fine random tubular pores; 20 percent pebbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.5); clear wavy boundary.

C2—18 to 28 inches; pale yellow (2.5Y 8/3) cobbly clay loam, pale brown (10YR 6/3) moist; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots and few medium roots; common very fine and few fine random tubular pores; 10 percent pebbles and 20 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); clear wavy boundary.

C3—28 to 43 inches; white (10YR 8/1) very cobbly clay loam, very pale brown (10YR 7/3) moist; weak medium and fine subangular blocky structure; hard, friable, sticky and plastic; common very fine roots and few fine and medium roots; common very fine and few fine random tubular pores; 20 percent pebbles and 20 percent cobbles; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); gradual wavy boundary.

C4—43 to 60 inches; white (2.5Y 8/2) very cobbly clay loam, light yellowish brown (2.5Y 6/4) moist; weak very fine and fine subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and fine roots; few very fine and fine random tubular pores; 20 percent pebbles and 20 percent cobbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4).

Bedrock is at a depth of 60 inches or more. The particle-size control section is 20 to 35 percent rock fragments.

C horizon: Value is 6 or 8 when dry and 4 to 7 when moist. Texture is gravelly clay loam or cobbly clay loam to a depth of 28 inches and is very cobbly clay loam below this depth.

Shupert Series

The Shupert series consists of very deep, well drained, slowly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation ranges from 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are fine-loamy, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Shupert gravelly loam in an area of Shupert-Winetti complex, about 4 miles north of Whitmore Park, about 1,000 feet south and 2,000 feet west of the southeast corner of sec. 32, T. 12 S., R. 12 E.

A1—0 to 3 inches; pale brown (10YR 6/3) gravelly loam, olive brown (2.5Y 4/3) moist; weak thin platy structure parting to moderate very fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots and few coarse roots; common very fine and fine random tubular pores; 30 percent pebbles; slightly

calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear smooth boundary.

C1—3 to 9 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine random tubular pores; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

IIC2—9 to 21 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine and few medium random tubular pores; 15 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC3—21 to 34 inches; light yellowish brown (10YR 6/4) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium and coarse roots; common very fine and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

IIC4—34 to 49 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and fine and few medium random tubular pores; 10 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

IIC5—49 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium random tubular pores; 5 percent pebbles; slightly calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4).

The particle-size control section is 0 to 15 percent rock fragments.

A horizon: Hue is 10YR or 2.5Y, value is 5 or 6 when dry and 4 or 5 when moist, and chroma is 2 or 3.

C horizon: Hue is 10YR or 2.5Y, value is 5 to 7 when dry and 4 or 5 when moist, and chroma is 2 to 4. Texture is clay loam, but in some pedons there are thin lenses of gravelly clay loam and gravelly loam.

Silas Series

The Silas series consists of very deep, somewhat poorly drained, moderately permeable soils on narrow alluvial valleys. These soils formed in alluvium derived from shale and sandstone. Slope is 0 to 3 percent. Elevation is 7,200 to 8,600 feet. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 38 to 45 degrees F.

These soils are fine-loamy, mixed Cumulic Cryoborolls.

Typical pedon of Silas loam, about 2 miles north of the town of Scofield, about 500 feet north and 1,100 feet east of the southwest corner of sec. 20, T. 12 S., R. 7 E.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; mildly alkaline (pH 7.6); abrupt smooth boundary.

A12—2 to 17 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak moderate subangular blocky structure parting to moderate coarse granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; common very fine and fine pores; neutral (pH 7.2); abrupt wavy boundary.

A13—17 to 28 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine pores; neutral (pH 7.2); abrupt wavy boundary.

C1—28 to 43 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; common medium faint yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; mildly alkaline (pH 7.4); clear smooth boundary.

C2—43 to 60 inches; light brownish gray (10YR 6/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; common medium faint yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; neutral (pH 7.2).

The mollic epipedon is 20 to 34 inches thick. The water table is at a depth of 20 to 40 inches.

A horizon: Value is 3 to 5 when dry and 2 or 3 when moist, and chroma is 1 to 3. Reaction is neutral or mildly alkaline.

C horizon: Value is 5 to 7 when dry and 4 or 5 when moist, and chroma is 2 or 3. Texture is loam or sandy clay loam with thin layers of silt loam and fine sandy loam.

Stormitt Series

The Stormitt series consists of very deep, well drained, moderately permeable soils on hillslopes, benches, and mesas. These soils formed in colluvium and glacial outwash derived from sandstone, shale, and quartzite. Slope is 3 to 30 percent. Elevation is 5,400 to 6,800 feet. Average annual precipitation is 8 to 10 inches, and average annual air temperature is 47 to 49 degrees F.

These soils are loamy-skeletal, carbonatic, mesic Ustollic Calciorthids.

Typical pedon of Stormitt gravelly sandy clay loam, 3 to 10 percent slopes, about 200 feet south and 800 feet west of the northeast corner of sec. 26, T. 14 S., R. 11 E.

A1—0 to 1 inch; pale brown (10YR 6/3) gravelly sandy clay loam, brown (10YR 5/3) moist; weak thin platy structure parting to weak fine granular; soft, friable, slightly sticky and slightly plastic; few fine roots; common very fine vesicular pores; 20 percent pebbles; moderately calcareous; mildly alkaline (pH 7.8); abrupt smooth boundary.

B21—1 to 5 inches; light yellowish brown (10YR 6/4) gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; weak coarse subangular blocky structure parting to weak fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common medium roots; common fine discontinuous pores; 20 percent pebbles; moderately calcareous; moderately alkaline (pH 8.0); clear smooth boundary.

B22—5 to 9 inches; brownish yellow (10YR 6/5) gravelly sandy clay loam, yellowish brown (10YR 5/5) moist; moderate coarse angular blocky structure parting to moderate fine angular and subangular blocky; slightly hard, friable, slightly sticky and plastic; few fine and common medium roots; few fine discontinuous pores; 15 percent pebbles and 5 percent cobbles; strongly calcareous; mildly alkaline (pH 7.8); clear wavy boundary.

C1ca—9 to 14 inches; very pale brown (10YR 7/4) very cobbly sandy clay loam, light yellowish brown (10YR 6/4) moist; moderate coarse angular blocky structure parting to moderate fine angular and subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine discontinuous pores; 15 percent pebbles and 35 percent cobbles; very strongly calcareous; moderately alkaline (pH 8.1); gradual wavy boundary.

C2ca—14 to 30 inches; very pale brown (10YR 8/4) very cobbly sandy clay loam, very pale brown (10YR 7/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 15 percent pebbles and 35 percent cobbles; very strongly calcareous; moderately alkaline (pH 8.0); gradual wavy boundary.

C3—30 to 60 inches; very pale brown (10YR 7/3) very cobbly sandy clay loam, brown (10YR 5/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; 15 percent pebbles and 35 percent cobbles; very strongly calcareous; strongly alkaline (pH 8.8).

Secondary calcium carbonate is at a depth of 7 to 15 inches.

A horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 to 5 when moist, and chroma is 2 to 4.

Cca horizon: Value is 6 to 8 when dry and 4 to 7 when moist, and chroma is 4 or 5. The horizon is 15 to 20 percent pebbles and 30 to 45 percent cobbles. Calcium carbonate equivalent is 40 to 70 percent.

Strych Series

The Strych series consists of very deep, well drained, moderately rapidly permeable soils on outwash plains, alluvial fans, toe slopes, fan terraces, and the sides of benches. These soils formed in colluvium, alluvium, and glacial outwash derived dominantly from sandstone and shale. Slope is 3 to 70 percent. Elevation is 5,300 to 7,500 feet. Average annual precipitation ranges from 8 to 14 inches, and average annual air temperature ranges from 45 to 47 degrees F.

These soils are loamy-skeletal, mixed, mesic Ustollic Calciorthids.

Typical pedon of Strych very stony loam, 3 to 15 percent slopes, about 2.5 miles southeast of Hiawatha, about 1,900 feet south and 2,300 feet west of the northeast corner of sec. 1, T. 16 S., R. 8 E.

A1—0 to 5 inches; pinkish gray (7.5YR 6/2) very stony loam, dark brown (7.5YR 4/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and many coarse roots; common very fine and few fine pores; 20 percent pebbles, 10 percent cobbles, and 15 percent stones; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.6); gradual wavy boundary.

C1ca—5 to 17 inches; light gray (10YR 7/2) very stony loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and many coarse roots; few very fine pores; 10 percent pebbles, 15 percent cobbles, and 10 percent stones; strongly calcareous; veins of calcium carbonate; strongly alkaline (pH 8.6); gradual wavy boundary.

C2ca—17 to 47 inches; very pale brown (10YR 7/3) very stony loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine and few fine pores; 15 percent pebbles, 25 percent cobbles, and 20 percent stones; strongly calcareous; powdery soft masses of calcium carbonate; strongly alkaline (pH 8.8); gradual wavy boundary.

C3—47 to 60 inches; very pale brown (10YR 8/4) very cobbly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable; few fine roots; few fine pores; 20 percent pebbles, 20 percent cobbles, and 5 percent stones; strongly calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8).

Secondary calcium carbonate is at a depth of 5 to 15 inches.

A horizon: Hue is 10YR or 7.5YR, and chroma is 2 to 4. Texture is very bouldery fine sandy loam, gravelly loam, or very stony loam. Calcium carbonate equivalent is 15 to 20 percent. Reaction is moderately alkaline or strongly alkaline.

Cca horizon: Value is 6 or 7 when dry, and chroma is 2 to 4. Texture is very stony sandy loam or very stony loam. Calcium carbonate equivalent is 25 to 40 percent.

C horizon: Hue is 7.5YR or 10YR, value is 6 to 8 when dry and 4 to 6 when moist, and chroma is 2 to 4. Texture is very cobbly sandy loam or very stony sandy loam. Calcium carbonate equivalent is 16 to 20 percent. Reaction is moderately alkaline or strongly alkaline.

Toze Family

The Toze family consists of very deep, well drained, moderately permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone, shale, and siltstone. Slope is 15 to 90 percent. Elevation is 6,700 to 9,600 feet. Average annual precipitation is 16 to 30 inches, and average annual air temperature is 36 to 45 degrees F.

These soils are fine-loamy, mixed Calcic Pachic Cryoborolls.

Reference pedon of a Toze family loam in an area of Doney-Toze families complex, about 2 miles west of Wattis, about 1,800 feet south and 1,500 feet east of the northwest corner of sec. 16, T. 5 S., R. 8 E.

O1—2 inches to 0; twigs and needles.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky; common very fine and few fine roots; common very fine and few fine pores; 10 percent cobbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

A12—2 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; strong coarse subangular blocky structure; slightly hard, friable, slightly sticky; common very fine and few fine roots; common very fine and few fine pores; 10 percent cobbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2); clear wavy boundary.

A13—9 to 17 inches; dark grayish brown (10YR 4/2) cobbly silt loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine and few fine pores; 5 percent pebbles and 10 percent cobbles and stones; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

A14—17 to 31 inches; dark grayish brown (10YR 4/2) cobbly silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots and many medium and coarse roots; few very fine pores; 5 percent pebbles and 10 percent cobbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

C1ca—31 to 44 inches; pale brown (10YR 6/3) cobbly silt loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots and many medium and coarse roots; few very fine pores; 10 percent pebbles, 10 percent cobbles, and 5 percent stones; strongly calcareous: soft masses of calcium carbonate; moderately alkaline (pH 8.4); clear smooth boundary.

C2—44 to 60 inches; pale brown (10YR 6/3) gravelly very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; 20 percent pebbles and 5 percent cobbles; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2).

The mollic epipedon is 24 to 31 inches thick. The particle-size control section is 20 to 30 percent rock fragments. Secondary calcium carbonate is at a depth of 24 to 31 inches.

A horizon: Texture is loam or fine sandy loam in the upper part and is loam, gravelly silt loam, or cobbly silt loam in the lower part. Reaction is mildly alkaline or moderately alkaline.

C1ca horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Texture is gravelly silt loam or cobbly silt loam. Clay content is 18 to 27 percent. Rock fragment content is 15 to 25 percent. Calcium carbonate equivalent is 20 to 30 percent.

C2 horizon: Value is 5 or 6 when dry, and chroma is 2 or 3. Texture is very gravelly fine sandy loam or gravelly very fine sandy loam. Clay content is 15 to 20 percent. Rock fragment content is 25 to 45 percent.

Trag Series

The Trag series consists of very deep, well drained, moderately permeable soils on mountain slopes, plateaus, canyonsides, valley floors, ridges, and toe slopes. These soils formed in colluvium and alluvium derived from sandstone and shale. Slope is 3 to 60 percent. Elevation is 7,000 to 9,700 feet. Average annual precipitation is 16 to 20 inches, and average annual air temperature is 36 to 45 degrees F.

These soils are fine-loamy, mixed Typic Argiborolls.

Typical pedon of a Trag loam in an area of Beje-Trag complex, in Whitmore Park, about 10 miles northeast of Price, about 1,100 feet south and 100 feet west of the northeast corner of sec. 25, T. 12 S., R. 11 E.

A1—0 to 5 inches; dark brown (7.5YR 4/2) loam, dark brown (10YR 3/3) moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; neutral (pH 6.6); abrupt smooth boundary.

B1—5 to 13 inches; brown (7.5YR 5/3) clay loam, dark brown (7.5YR 3/3) moist; moderate medium and strong fine subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine pores; neutral (pH 6.8); clear smooth boundary.

B21t—13 to 25 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/4) moist; moderate fine prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and very plastic; few very fine and fine roots; many very fine and fine pores; many moderately thick clay films on faces of peds; neutral (pH 6.6); clear smooth boundary.

B22t—25 to 39 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; moderate fine prismatic structure parting to strong medium subangular blocky; very hard, very firm, sticky and plastic; few very fine and fine roots; many very fine and fine pores; thin clay films on faces of peds; neutral (pH 6.6); abrupt wavy boundary.

C—39 to 60 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few very fine and fine roots; common fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.2).

Bedrock is at a depth of 60 inches or more. The solum is 39 to 44 inches thick. The particle-size control section is 0 to 15 percent rock fragments. The mollic epipedon is 7 to 13 inches thick.

A horizon: Hue is 7.5YR or 10YR, value is 2 or 3 when moist, and chroma is 2 or 3. Texture is loam, clay loam, or stony loam.

B horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4. Clay content is 30 to 35 percent.

C horizon: Clay content is 27 to 30 percent. Rock fragment content is 0 to 10 percent. Reaction is mildly alkaline or moderately alkaline.

Travessilla Series

The Travessilla series consists of shallow, well drained, moderately permeable and moderately rapidly permeable soils on mesas, benches, canyonsides, mountain slopes, and foot slopes. These soils formed in residuum and colluvium derived dominantly from sandstone and interbedded shale. Slope is 1 to 80 percent. Elevation is 5,000 to 8,700 feet but is dominantly 5,500 to 6,500 feet. Average annual precipitation is 10 to 14 inches, and average annual air temperature is 45 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Typical pedon of a Travessilla fine sandy loam in an area of Travessilla-Rock outcrop complex, about 5 miles west of Price, about 2,400 feet north and 2,500 feet east of the southwest corner of sec. 15, T. 14 S., R. 9 E.

A1—0 to 2 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak thick platy structure; soft, very friable; few fine and medium roots; few fine pores; slightly calcareous; mildly alkaline (pH 7.6); clear smooth boundary.

C1—2 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine subangular blocky; soft, very friable; few fine and medium roots; few fine pores; 15 percent channers; mildly alkaline (pH 7.5); clear smooth boundary.

C2—5 to 10 inches; brown (10YR 5/3) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable; few fine and medium roots; few fine and medium pores; 15 percent channers; moderately calcareous; mildly alkaline (pH 7.6); abrupt wavy boundary.

R—10 inches; sandstone.

Bedrock is at a depth of 7 to 20 inches.

A horizon: Hue is 7.5YR or 10YR, value is 5 or 6 when dry and 3 or 4 when moist, and chroma is 3 or 4. Texture is sandy loam, very gravelly fine sandy loam, fine sandy loam, or extremely bouldery loam. Reaction is mildly alkaline or moderately alkaline.

C horizon: Hue is 7.5YR or 10YR, value is 5 to 7 when dry and 4 to 6 when moist, and chroma is 3 or 4. Texture is sandy loam, fine sandy loam, very fine sandy loam, or loam. Rock fragment content is 0 to 15 percent. Reaction is mildly alkaline or moderately alkaline.

Travessilla Family

The Travessilla family consists of shallow, well drained, moderately rapidly permeable soil on benches and canyonsides. These soils formed in residuum derived dominantly from sandstone. Slope is 1 to 50 percent. Elevation is 5,600 to 5,800 feet. Average annual precipitation is 8 to 10 inches, and average annual air temperature is 48 to 50 degrees F.

These soils are loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents.

Reference pedon of Travessilla family, 1 to 8 percent slopes, 1,500 feet north and 500 feet west of the southeast corner of sec. 1, T. 11 S., R. 17 E.

A—0 to 4 inches; light yellowish brown (10YR 6/4) channery sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky; common very fine and fine roots and few medium and coarse roots; few very fine pores; slightly calcareous; moderately alkaline (pH 8.4); abrupt wavy boundary.

C1—4 to 11 inches; light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; few very fine pores; moderately calcareous; disseminated calcium carbonate; moderately alkaline (pH 8.4); clear wavy boundary.

C2—11 to 13 inches; very pale brown (10YR 7/4) sandy loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; moderately calcareous; disseminated calcium carbonate; strongly alkaline (pH 8.8); abrupt wavy boundary.

R—13 inches; sandstone.

Bedrock is at a depth of 7 to 20 inches. Clay content in the particle-size control section ranges from 8 to 18 percent.

Uinta Family

The Uinta family consists of deep, well drained, moderately slowly permeable soils on mountain slopes. These soils formed in colluvium derived dominantly from sandstone and siltstone. Slope is 40 to 70 percent. Elevation is 7,800 to 9,600 feet. Average annual precipitation is 20 to 30 inches, and average annual air temperature is 34 to 38 degrees F.

These soils are fine-loamy, mixed Typic Cryoboralfs.

Reference pedon of a Uinta family loam in an area of Uinta-Toze families complex, about 0.8 mile southeast of Clear Creek, about 1,500 feet east and 2,250 feet south of the northwest corner of sec. 4, T. 14 S., R. 7 E.

O1—1 inch to 0; leaves and fir needles.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate coarse granular structure; soft, friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; 5 percent pebbles, 5 percent cobbles, and 5 percent stones; neutral (pH 6.8); abrupt wavy boundary.

A2—3 to 11 inches; light yellowish brown (10YR 6/4) stony sandy loam, yellowish brown (10YR 5/4) moist; moderate thick platy structure; slightly hard, friable; common very fine, fine, and medium roots; 10 percent pebbles, 5 percent cobbles, and 5 percent stones; neutral (pH 6.6); clear smooth boundary.

B21t—11 to 24 inches; pale brown (10YR 6/3) stony clay loam, brown (10YR 4/3) moist; moderate medium subangular blocky structure; extremely hard, very firm, sticky and plastic; common very fine, fine, medium, and coarse roots; common moderately thick clay films on ped faces; 5 percent pebbles, 5 percent cobbles, and 10 percent stones; neutral (pH 6.6); abrupt irregular boundary.

B22t—24 to 42 inches; light brownish gray (10YR 6/2) stony clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine, fine, medium, and coarse roots; common moderately thick clay films on ped faces; 10 percent pebbles, 15 percent cobbles, and 10 percent stones; mildly alkaline (pH 7.8); abrupt irregular boundary.

R—42 inches; sandstone.

Depth to bedrock and thickness of the solum are 40 to 60 inches. The particle-size control section is 15 to 35 percent rock fragments.

Winetti Series

The Winetti series consists of very deep, well drained, moderately rapidly permeable soils on narrow valley and canyon floors. These soils formed in alluvium derived from sandstone and shale. Slope is 1 to 8 percent. Elevation is 4,600 to 7,200 feet but commonly is 5,200 to 6,400 feet. Average annual precipitation is 12 to 16 inches, and average annual air temperature is 43 to 45 degrees F.

These soils are loamy-skeletal, mixed (calcareous), frigid Typic Ustifluvents.

Typical pedon of a Winetti bouldery sandy loam in an area of Shupert-Winetti complex, about 2.5 miles north of Sunnyside Mine, about 1,800 feet south and 2,500 feet west of the northeast corner of sec. 20, T. 14 S., R. 14 E.

A1—0 to 6 inches; grayish brown (10YR 5/2) bouldery sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; soft, very

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded during the period 1951-57 at Clear Creek, UT; elevation 8,300 feet]

Month	Temperature			Precipitation	
	Mean daily maximum	Mean daily minimum	Mean	Mean	Mean snowfall
	°F	°F	°F	In	In
January----	32.4	7.6	20.1	2.29	46.1
February---	34.1	8.7	21.4	2.10	39.4
March------	38.1	12.5	25.3	2.29	43.2
April------	47.2	21.5	34.4	1.90	25.6
May--------	58.4	28.7	43.5	1.38	9.4
June-------	69.3	35.4	52.4	1.12	.6
July-------	77.0	42.2	59.6	1.49	0
August-----	74.1	41.4	57.8	2.15	0
September--	66.9	33.9	50.4	1.60	2.0
October----	56.7	26.9	41.9	1.49	7.8
November---	41.3	16.6	28.9	1.58	27.2
December---	34.4	10.1	22.3	2.59	40.0
Year-----	52.5	23.8	38.2	21.98	241.3

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded during the period 1951-80 at Hiawatha, UT; elevation 7,230 feet]

Month	Temperature			Precipitation	
	Mean daily maximum	Mean daily minimum	Mean	Mean	Mean snowfall
	°F	°F	°F	In	In
January----	32.4	13.7	23.1	1.05	12.9
February---	37.0	17.6	27.3	1.03	13.0
March------	43.9	22.1	33.0	1.04	10.6
April------	54.2	30.3	42.3	1.01	2.9
May--------	64.6	39.2	51.9	1.19	2.5
June-------	75.5	49.1	62.3	.95	0
July-------	83.3	56.1	69.7	1.07	0
August-----	79.3	54.2	66.8	1.72	0
September--	71.6	46.4	59.0	1.26	.4
October----	59.7	36.4	48.1	1.12	1.0
November---	43.3	23.8	33.6	.89	7.6
December---	34.7	16.1	25.4	1.18	12.6
Year-----	56.6	33.8	45.2	13.51	63.50

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded during the period 1948-80 at Scofield Dam, UT; elevation 7,720 feet]

Month	Temperature			Precipitation	
	Mean daily maximum	Mean daily minimum	Mean	Mean	Mean snowfall
	°F	°F	°F	In	In
January----	28.0	.1	14.0	2.00	24.8
February---	32.2	2.8	17.5	1.64	20.7
March------	37.9	11.1	24.5	1.33	20.3
April------	47.9	21.4	34.7	1.09	8.8
May--------	59.8	30.7	45.3	1.07	1.5
June-------	70.1	37.6	53.9	.92	0
July-------	78.0	44.2	61.1	1.02	0
August-----	75.2	42.7	59.0	1.39	0
September--	67.6	34.7	51.2	1.04	.4
October----	56.5	26.2	41.4	1.14	3.4
November---	40.1	15.6	27.9	1.12	10.6
December---	31.0	3.9	17.5	1.49	17.0
Year-----	52.0	22.6	37.3	15.25	107.5

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

[Recorded during the period 1958-80 at Sunnyside, UT; elevation 6,780 feet]

Month	Temperature			Precipitation	
	Mean daily maximum	Mean daily minimum	Mean	Mean	Mean snowfall
	°F	°F	°F	In	In
January----	34.3	13.1	23.7	.80	11.3
February---	41.3	19.3	30.3	.90	11.3
March------	45.4	22.1	33.8	1.08	6.8
April------	55.0	29.7	42.4	.94	2.6
May--------	65.7	39.6	52.7	1.07	0.2
June-------	77.6	48.4	63.0	.84	0
July-------	85.5	56.3	70.9	1.08	0
August-----	82.7	53.6	68.2	1.27	0
September--	73.5	45.7	59.6	1.34	0
October----	60.9	35.6	48.3	1.26	0.6
November---	47.0	24.6	35.8	.76	2.0
December---	37.3	16.2	26.8	.64	5.3
Year-----	58.9	33.7	46.3	11.98	40.1

TABLE 2.--ESTIMATED PAN EVAPORATION

Month	Reporting Station			
	Clear Creek	Hiawatha	Scofield Dam	Sunnyside
	In	In	In	In
May--------	6.53	7.96	7.59	8.36
June-------	7.41	8.10	7.24	8.95
July-------	7.93	9.38	8.06	10.11
August-----	6.33	9.03	6.57	7.99
September--	4.67	5.20	4.83	5.78
October----	3.34	5.46	3.24	5.92
Total----	36.21	45.13	37.53	47.11

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed. Two asterisks identifies a woodland site that supports grazeable understory]

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
1---------- Atrac	Upland Loam (Basin Big Sagebrush).	Favorable	1,300	Western wheatgrass----------	15
		Normal	1,100	Big sagebrush----------	15
		Unfavorable	800	Indian ricegrass----------	10
				Needleandthread----------	10
				Muttongrass----------	10
				Fourwing saltbush----------	5
4---------- Beje	Mountain Shallow Loam (Black Sagebrush).	Favorable	1,000	Bluegrass----------	20
		Normal	750	Black sagebrush----------	20
		Unfavorable	500	Bluebunch wheatgrass----------	10
				Salina wildrye----------	10
5*:					
Beje----------	Mountain Shallow Loam (Black Sagebrush).	Favorable	1,000	Bluegrass----------	20
		Normal	750	Black sagebrush----------	20
		Unfavorable	500	Bluebunch wheatgrass----------	10
				Salina wildrye----------	10
Beje----------	Mountain Stony Loam (Browse)--	Favorable	1,600	Birchleaf mountainmahogany----	25
		Normal	1,200	Serviceberry----------	20
		Unfavorable	900	Salina wildrye----------	5
				Bluegrass----------	5
				Elk sedge----------	5
				Gambel oak----------	5
				Snowberry----------	5
				Mountain big sagebrush--------	5
6*:					
Beje----------	Mountain Shallow Loam (Mountain Big Sagebrush).	Favorable	1,500	Mountain big sagebrush--------	20
		Normal	1,200	Bluegrass----------	10
		Unfavorable	850	Slender wheatgrass----------	10
				Salina wildrye----------	10
				Letterman needlegrass---------	5
				Needleandthread----------	5
				Prairie junegrass----------	5
				Snowberry----------	5
Comodore----------	Mountain Very Steep Stony Loam (Douglas-fir)**.	Favorable	700	Sedge----------	15
		Normal	500	Snowberry----------	15
		Unfavorable	400	Salina wildrye----------	15
				Slender wheatgrass----------	10
				Birchleaf mountainmahogany----	5
				Rocky Mountain juniper--------	5
7*:					
Beje----------	Mountain Shallow Loam (Mountain Big Sagebrush).	Favorable	1,500	Mountain big sagebrush--------	20
		Normal	1,200	Bluegrass----------	10
		Unfavorable	850	Slender wheatgrass----------	10
				Salina wildrye----------	10
				Letterman needlegrass---------	5
				Needleandthread----------	5
				Prairie junegrass----------	5
				Snowberry----------	5
Trag----------	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye----------	35
		Normal	1,500	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Bluegrass----------	5
				Mountain big sagebrush--------	5
				Utah serviceberry----------	5
				Antelope bitterbrush----------	5
				Indian ricegrass----------	5
				Letterman needlegrass---------	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
8---------- Billings	Desert Loam----------	Favorable	700	Indian ricegrass----------	20
		Normal	500	Shadscale----------	20
		Unfavorable	300	Galleta----------	10
				Globemallow----------	5
				Winterfat----------	5
				Bud sagebrush----------	5
9*:					
Billings----------	Alkali Flat----------	Favorable	1,000	Black greasewood----------	30
		Normal	700	Bottlebrush squirreltail------	10
		Unfavorable	500	Alkali sacaton----------	10
				Shadscale----------	10
				Galleta----------	5
				Indian ricegrass----------	5
				Seepweed----------	5
Gullied land.					
10*---------- Cabba	Upland Shallow Loam (Pinyon-Utah Juniper)**.	Favorable	500	Birchleaf mountainmahogany----	15
		Normal	400	Mexican cliffrose----------	15
		Unfavorable	300	Salina wildrye----------	10
				Indian ricegrass----------	10
				Mormon-tea----------	10
11*---------- Cabba	Upland Very Steep Stony Loam (Pinyon-Utah Juniper)**.	Favorable	800	Birchleaf mountainmahogany----	15
		Normal	600	Salina wildrye----------	10
		Unfavorable	500	Needleandthread----------	10
				Black sagebrush----------	10
				Indian ricegrass----------	5
				Bluegrass----------	5
				Bluebunch wheatgrass----------	5
				Utah serviceberry----------	5
				Mormon-tea----------	5
12*:					
Cabba----------	Upland Shallow Clay Loam (Utah Juniper-Pinyon)**.	Favorable	400	Salina wildrye----------	15
		Normal	300	Indian ricegrass----------	10
		Unfavorable	200	Blue grama----------	5
				Western wheatgrass----------	5
				Birchleaf mountainmahogany----	5
				Utah serviceberry----------	5
				Douglas rabbitbrush----------	5
Badland.					
Rock outcrop.					
13*:					
Cabba----------	Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)**.	Favorable	700	Salina wildrye----------	20
		Normal	500	Indian ricegrass----------	10
		Unfavorable	300	Birchleaf mountainmahogany----	10
				Utah serviceberry----------	10
				Bluegrass----------	5
				Needleandthread----------	5
				Bluebunch wheatgrass----------	5
				Antelope bitterbrush----------	5
				Mormon-tea----------	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
13*:					
Guben	Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)**.	Favorable	700	Salina wildrye	20
		Normal	500	Indian ricegrass	10
		Unfavorable	300	Utah serviceberry	10
				Birchleaf mountainmahogany	10
				Bluegrass	5
				Bluebunch wheatgrass	5
				Antelope bitterbrush	5
				Needleandthread	5
				Mormon-tea	5
Rock outcrop.					
14*:					
Casmos	Desert Shallow Loam (Black Sagebrush).	Favorable	450	Black sagebrush	40
		Normal	350	Shadscale	15
		Unfavorable	200	Galleta	10
				Bottlebrush squirreltail	5
				Salina wildrye	5
Rock outcrop.					
15*:					
Casmos	Desert Very Steep Shallow Loam (Shadscale).	Favorable	400	Shadscale	30
		Normal	250	Galleta	15
		Unfavorable	150	Fourwing saltbush	15
				Salina wildrye	5
				Bud sagebrush	5
Rock outcrop.					
16 Chipeta	Desert Shallow Clay	Favorable	300	Mat saltbush	60
		Normal	200	Galleta	10
		Unfavorable	100	Deserttrumpet	5
				Bud sagebrush	5
17*:					
Chipeta	Desert Shallow Clay	Favorable	300	Mat saltbush	60
		Normal	200	Galleta	10
		Unfavorable	100	Deserttrumpet	5
				Bud sagebrush	5
Badland.					
18*:					
Chipeta	Desert Shallow Clay	Favorable	300	Mat saltbush	60
		Normal	200	Galleta	10
		Unfavorable	100	Deserttrumpet	5
				Bud sagebrush	5
Persayo	Desert Loamy Clay	Favorable	400	Shadscale	25
		Normal	300	Galleta	15
		Unfavorable	150	Indian ricegrass	10
				Deserttrumpet	5
				Bud sagebrush	5
19 Chupadera	Upland Loam (Basin Big Sagebrush).	Favorable	1,300	Western wheatgrass	15
		Normal	1,100	Big sagebrush	15
		Unfavorable	800	Indian ricegrass	10
				Needleandthread	10
				Muttongrass	10
				Fourwing saltbush	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
20*:					
Comodore	Mountain Very Steep Stony Loam (Douglas-fir)**.	Favorable	700	Salina wildrye	15
		Normal	500	Snowberry	15
		Unfavorable	400	Slender wheatgrass	10
				Elk sedge	5
				Indian ricegrass	5
				Birchleaf mountainmahogany	5
				Rocky Mountain juniper	5
Datino Variant	Mountain Very Steep Stony Loam (Douglas-fir)**.	Favorable	700	Salina wildrye	15
		Normal	500	Snowberry	15
		Unfavorable	400	Slender wheatgrass	10
				Elk sedge	5
				Indian ricegrass	5
				Birchleaf mountainmahogany	5
				Rocky Mountain juniper	5
21, 22 Croydon	High Mountain Loam (Aspen)**	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Quaking aspen	10
				Bluegrass	5
23*:					
Curecanti	Mountain Very Steep Loam (Oak).	Favorable	1,400	Gambel oak	30
		Normal	1,000	Bluegrass	10
		Unfavorable	600	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
Pathead	Mountain Very Steep Stony Loam (Curlleaf Mountainmahogany).	Favorable	1,100	Curlleaf mountainmahogany	30
		Normal	800	Salina wildrye	20
		Unfavorable	600	Utah serviceberry	5
				Snowberry	5
				Indian ricegrass	5
				Wheatgrass	5
Pathead	Mountain Very Steep Loam (Saline Wildrye).	Favorable	1,400	Salina wildrye	35
		Normal	1,200	Snowberry	10
		Unfavorable	1,000	Bluegrass	5
				Bluebunch wheatgrass	5
				Needlegrass	5
				Prairie junegrass	5
				Birchleaf mountainmahogany	5
				Antelope bitterbrush	5
				Utah serviceberry	5
				Indian ricegrass	5
24 Datino Variant	Mountain Very Steep Loam (Oak).	Favorable	1,400	Gambel oak	30
		Normal	1,000	Bluegrass	10
		Unfavorable	600	Snowberry	10
				Wheatgrass	5
				Serviceberry	5
				Mountain big sagebrush	5
25* Doney	Upland Loam (Basin Big Sagebrush).	Favorable	1,300	Western wheatgrass	15
		Normal	1,100	Big sagebrush	15
		Unfavorable	800	Indian ricegrass	10
				Needleandthread	10
				Muttongrass	10
				Fourwing saltbush	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
26*---------- Doney	Mountain Very Steep Loam (Saline Wildrye).	Favorable	1,400	Salina wildrye----------	35
		Normal	1,200	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Prairie junegrass----------	5
				Bluegrass----------	5
				Birchleaf mountainmahogany----	5
				Antelope bitterbrush----------	5
				Utah serviceberry----------	5
27*: Doney----------	Mountain Very Steep Loam (Saline Wildrye).	Favorable	1,400	Salina wildrye----------	35
		Normal	1,200	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Prairie junegrass----------	5
				Bluegrass----------	5
				Birchleaf mountainmahogany----	5
				Antelope bitterbrush----------	5
				Utah serviceberry----------	5
Podo----------	Mountain Very Steep Stony Loam (Browse).	Favorable	1,300	Birchleaf mountainmahogany----	25
		Normal	1,000	Utah serviceberry----------	20
		Unfavorable	800	Salina wildrye----------	5
				Bluegrass----------	5
				Elk sedge----------	5
				Mountain big sagebrush--------	5
				Gambel oak----------	5
				Snowberry----------	5
28*: Doney----------	Mountain Very Steep Loam (Saline Wildrye).	Favorable	1,400	Salina wildrye----------	35
		Normal	1,200	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Prairie junegrass----------	5
				Bluegrass----------	5
				Birchleaf mountainmahogany----	5
				Antelope bitterbrush----------	5
				Utah serviceberry----------	5
Toze----------	Mountain Very Steep Loam (Douglas-fir)**.	Favorable	400	Sedge----------	15
		Normal	250	Snowberry----------	15
		Unfavorable	100	Gambel oak----------	15
				Bluegrass----------	5
				Utah serviceberry----------	5
				Birchleaf mountainmahogany----	5
				Rocky Mountain juniper--------	5
30*: Falcon----------	Mountain Shallow Loam (Mountain Big Sagebrush).	Favorable	1,500	Mountain big sagebrush--------	20
		Normal	1,200	Slender wheatgrass----------	10
		Unfavorable	850	Bluegrass----------	10
				Salina wildrye----------	10
				Letterman needlegrass---------	5
				Needleandthread----------	5
				Prairie junegrass----------	5
				Snowberry----------	5
Rock outcrop.					
31---------- Ferron	Salt Meadow----------	Favorable	2,000	Inland saltgrass----------	30
		Normal	1,500	Alkali sacaton----------	15
		Unfavorable	1,000	Tufted hairgrass----------	5
				Sedge----------	5
				Baltic rush----------	5
				Western wheatgrass----------	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
32*:					
Frandsen	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye	35
		Normal	1,500	Snowberry	10
		Unfavorable	1,000	Bluebunch wheatgrass	5
				Bluegrass	5
				Indian ricegrass	5
				Letterman needlegrass	5
				Utah serviceberry	5
				Mountain big sagebrush	5
				Antelope bitterbrush	5
Gullied land.					
33*:					
Gerst	Upland Shallow Clay Loam (Utah Juniper-Pinyon)**.	Favorable	500	Salina wildrye	15
		Normal	400	Indian ricegrass	10
		Unfavorable	250	Blue grama	5
				Western wheatgrass	5
				Hood phlox	5
				Rock goldenrod	5
				Utah juniper	5
				Pinyon	5
				Birchleaf mountainmahogany	5
				Douglas rabbitbrush	5
				Utah serviceberry	5
Badland.					
Rubbleland.					
34*:					
Gerst	Upland Very Steep Shallow Clay Loam (Utah Juniper-Pinyon)**.	Favorable	400	Salina wildrye	15
		Normal	300	Indian ricegrass	10
		Unfavorable	200	Blue grama	5
				Western wheatgrass	5
				Hood phlox	5
				Rock goldenrod	5
				Utah juniper	5
				Pinyon	5
				Birchleaf mountainmahogany	5
				Douglas rabbitbrush	5
				Utah serviceberry	5
Badland.					
Rubbleland.					
35*:					
Gerst	Semidesert Shallow Loam (Black Sagebrush).	Favorable	700	Black sagebrush	30
		Normal	400	Indian ricegrass	15
		Unfavorable	300	Galleta	10
				Shadscale	10
				Blue grama	5
				Bud sagebrush	5
				Slenderbush eriogonum	5
Badland.					
Stormitt	Semidesert Gravelly Loam (Wyoming Big Sagebrush).	Favorable	600	Wyoming big sagebrush	30
		Normal	400	Galleta	15
		Unfavorable	300	Indian ricegrass	10
				Needleandthread	10
				Bud sagebrush	5
				Shadscale	5
				Winterfat	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
107*:					
Winetti	Loamy Bottom	Favorable	2,000	Basin wildrye	25
		Normal	1,500	Basin big sagebrush	15
		Unfavorable	1,000	Needleandthread	10
				Western wheatgrass	10
				Muttongrass	10
				Indian ricegrass	5
				Rubber rabbitbrush	5
108 Silas	Mountain Meadow	Favorable	3,500	Sedge	20
		Normal	3,000	Tufted hairgrass	10
		Unfavorable	2,500	Common spikerush	5
				Kentucky bluegrass	5
				Western wheatgrass	5
				Clover	5
				Shrubby cinquefoil	5
				Willow	5
109*:					
Silas	Mountain Meadow	Favorable	3,500	Sedge	20
		Normal	3,000	Tufted hairgrass	10
		Unfavorable	2,500	Common spikerush	5
				Kentucky bluegrass	5
				Western wheatgrass	5
				Clover	5
				Shrubby cinquefoil	5
				Willow	5
Brycan	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye	35
		Normal	1,500	Snowberry	10
		Unfavorable	1,000	Bluebunch wheatgrass	5
				Indian ricegrass	5
				Letterman needlegrass	5
				Bluegrass	5
				Utah serviceberry	5
				Antelope bitterbrush	5
				Mountain big sagebrush	5
110 Stormitt	Semidesert Gravelly Loam (Wyoming Big Sagebrush).	Favorable	600	Wyoming big sagebrush	30
		Normal	400	Galleta	15
		Unfavorable	300	Indian ricegrass	10
				Needleandthread	10
				Bud sagebrush	5
				Shadscale	5
				Winterfat	5
111*:					
Stormitt	Semidesert Gravelly Loam (Wyoming Big Sagebrush).	Favorable	600	Wyoming big sagebrush	30
		Normal	400	Galleta	15
		Unfavorable	300	Indian ricegrass	10
				Needleandthread	10
				Bud sagebrush	5
				Shadscale	5
				Winterfat	5
Minchey	Desert Loam	Favorable	700	Indian ricegrass	20
		Normal	500	Shadscale	20
		Unfavorable	300	Galleta	10
				Globemallow	5
				Bud sagebrush	5
				Winterfat	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
112---------- Strych	Semidesert Bouldery Loam------	Favorable	900	Indian ricegrass----------	25
		Normal	700	Shadscale----------	15
		Unfavorable	400	Salina wildrye----------	10
				Galleta----------	10
				Needleandthread----------	5
				Mormon-tea----------	5
				Douglas rabbitbrush----------	5
				Winterfat----------	5
113---------- Strych	Upland Stony Loam (Pinyon-Utah Juniper)**.	Favorable	1,000	Birchleaf mountainmahogany----	15
		Normal	850	Salina wildrye----------	10
		Unfavorable	600	Needleandthread----------	10
				Black sagebrush----------	10
				Indian ricegrass----------	5
				Mormon-tea----------	5
				Bluegrass----------	5
				Bluebunch wheatgrass----------	5
				Utah serviceberry----------	5
114---------- Strych	Semidesert Stony Loam (Utah Juniper-Pinyon)**.	Favorable	650	Galleta----------	10
		Normal	500	Needleandthread----------	10
		Unfavorable	350	Birchleaf mountainmahogany----	10
				Mormon-tea----------	10
				Black sagebrush----------	10
				Salina wildrye----------	5
				Bottlebrush squirreltail------	5
				Indian ricegrass----------	5
115---------- Trag	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye----------	35
		Normal	1,500	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Bluegrass----------	5
				Mountain big sagebrush--------	5
				Utah serviceberry----------	5
				Antelope bitterbrush----------	5
				Indian ricegrass----------	5
				Letterman needlegrass---------	5
116*:					
Trag----------	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye----------	35
		Normal	1,500	Snowberry----------	10
		Unfavorable	1,000	Bluebunch wheatgrass----------	5
				Bluegrass----------	5
				Mountain big sagebrush--------	5
				Utah serviceberry----------	5
				Antelope bitterbrush----------	5
				Indian ricegrass----------	5
				Letterman needlegrass---------	5
Beje----------	Mountain Shallow Loam (Mountain Big Sagebrush).	Favorable	1,500	Mountain big sagebrush--------	20
		Normal	1,200	Bluegrass----------	10
		Unfavorable	850	Slender wheatgrass----------	10
				Salina wildrye----------	10
				Letterman needlegrass---------	5
				Needleandthread----------	5
				Prairie junegrass----------	5
				Snowberry----------	5
Rottulee----------	Mountain Stony Loam (Browse)--	Favorable	1,600	Birchleaf mountainmahogany----	25
		Normal	1,200	Utah serviceberry----------	20
		Unfavorable	900	Bluegrass----------	5
				Salina wildrye----------	5
				Elk sedge----------	5
				Mountain big sagebrush--------	5
				Gambel oak----------	5
				Snowberry----------	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
117*:					
Trag	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye	35
		Normal	1,500	Snowberry	10
		Unfavorable	1,000	Bluebunch wheatgrass	5
				Bluegrass	5
				Mountain big sagebrush	5
				Utah serviceberry	5
				Antelope bitterbrush	5
				Indian ricegrass	5
				Letterman needlegrass	5
Beje	Mountain Shallow Loam (Mountain Big Sagebrush).	Favorable	1,500	Mountain big sagebrush	20
		Normal	1,200	Bluegrass	10
		Unfavorable	850	Slender wheatgrass	10
				Salina wildrye	10
				Letterman needlegrass	5
				Needleandthread	5
				Prairie junegrass	5
				Snowberry	5
Senchert	High Mountain Loam (Aspen)**	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Bluegrass	5
118*:					
Trag	Mountain Loam (Saline Wildrye).	Favorable	2,000	Salina wildrye	35
		Normal	1,500	Snowberry	10
		Unfavorable	1,000	Bluebunch wheatgrass	5
				Bluegrass	5
				Mountain big sagebrush	5
				Utah serviceberry	5
				Antelope bitterbrush	5
				Indian ricegrass	5
				Letterman needlegrass	5
Croydon	High Mountain Loam (Aspen)**	Favorable	2,000	Slender wheatgrass	15
		Normal	1,500	Thurber fescue	10
		Unfavorable	1,000	Columbia needlegrass	10
				Blue wildrye	10
				Brome	10
				Bluegrass	5
119 Travessilla	Upland Shallow Loam (Pinyon-Utah Juniper)**.	Favorable	500	Birchleaf mountainmahogany	15
		Normal	400	Mexican cliffrose	15
		Unfavorable	300	Salina wildrye	10
				Indian ricegrass	10
				Mormon-tea	10
120*:					
Travessilla	Semidesert Shallow Loam (Utah Juniper-Pinyon)**.	Favorable	350	Salina wildrye	20
		Normal	250	Black sagebrush	20
		Unfavorable	150	Bluebunch wheatgrass	10
				Mormon-tea	10
				Galleta	5
Rock outcrop.					

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
121*:					
Travessilla	Upland Very Steep Shallow Loam (Pinyon-Utah Juniper)**.	Favorable	700	Salina wildrye	20
		Normal	500	Indian ricegrass	10
		Unfavorable	300	Birchleaf mountainmahogany	10
				Utah serviceberry	10
				Bluegrass	5
				Needleandthread	5
				Bluebunch wheatgrass	5
				Mormon-tea	5
				Antelope bitterbrush	5
Rock outcrop.					
Gerst	Semidesert Very Steep Shallow Clay (Utah Juniper)**.	Favorable	600	Shadscale	30
		Normal	500	Salina wildrye	25
		Unfavorable	350	Galleta	10
				Bluebunch wheatgrass	10
				Western wheatgrass	5
122*:					
Travessilla	Semidesert Very Steep Shallow Loam (Utah Juniper-Pinyon)**.	Favorable	250	Salina wildrye	20
		Normal	200	Black sagebrush	20
		Unfavorable	100	Bluebunch wheatgrass	10
				Blue grama	10
				Galleta	5
Travessilla family	Semidesert Shallow Loam (Black Sagebrush).	Favorable	700	Black sagebrush	30
		Normal	400	Indian ricegrass	15
		Unfavorable	300	Galleta	10
				Shadscale	10
				Blue grama	5
				Bud sagebrush	5
				Slenderbush eriogonum	5
Rock outcrop.					
123* Travessilla	Semidesert Shallow Loam (Black Sagebrush).	Favorable	700	Black sagebrush	30
		Normal	400	Indian ricegrass	15
		Unfavorable	300	Galleta	10
				Shadscale	10
				Blue grama	5
				Bud sagebrush	5
				Slenderbush eriogonum	5
124*:					
Uinta	High Mountain Very Steep Stony Loam (Engelmann Spruce)**.	Favorable	100	Blueberry	50
		Normal	75	Oregon-grape	15
		Unfavorable	50	Sedge	10
				Pinegrass	10
				Currant	10
Podo	Mountain Shallow Loam (Saline Wildrye).	Favorable	800	Salina wildrye	30
		Normal	600	Indian ricegrass	5
		Unfavorable	400	Needlegrass	5
				Bluegrass	5
				Utah serviceberry	5
				Birchleaf mountainmahogany	5
				Snowberry	5
				Antelope bitterbrush	5

See footnote at end of table.

TABLE 4.--RANGELAND AND WOODLAND UNDERSTORY PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Grazing site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
125*:					
Uinta	High Mountain Very Steep Stony Loam (Engelmann Spruce)**.	Favorable	100	Blueberry	50
		Normal	75	Oregon-grape	15
		Unfavorable	50	Sedge	10
				Pinegrass	10
				Currant	10
Toze	High Mountain Very Steep Stony Loam (Engelmann Spruce)**.	Favorable	100	Blueberry	50
		Normal	75	Oregon-grape	15
		Unfavorable	50	Sedge	10
				Pinegrass	10
				Currant	10
126 Winetti Variant	Loamy Bottom	Favorable	2,000	Basin wildrye	25
		Normal	1,500	Basin big sagebrush	15
		Unfavorable	1,000	Needleandthread	10
				Western wheatgrass	10
				Muttongrass	10
				Indian ricegrass	5
				Rubber rabbitbrush	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Atrac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
2*. Badland				
3*:				
Badland.				
Rubbleland.				
Rock outcrop.				
4 Beje	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.
5*:				
Beje	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
Beje	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
6*:				
Beje	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Comodore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones, slope.
7*:				
Beje	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Trag	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
8 Billings	Moderate: excess salt.	Moderate: excess salt.	Moderate: slope, excess salt.	Severe: erodes easily.
9*:				
Billings	Severe: flooding, excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: erodes easily.
Gullied land.				
10* Cabba	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1---------- Atrac	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
2*. Badland											
3*:											
Badland.											
Rubbleland.											
Rock outcrop.											
4---------- Beje	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
5*:											
Beje----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Beje----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
6*:											
Beje----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Comodore----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Poor.
7*:											
Beje----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Trag----------	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
8---------- Billings	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
9*:											
Billings----------	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Gullied land.											
10*, 11*---------- Cabba	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
12*:											
Cabba----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Badland.											
Rock outcrop.											
13*:											
Cabba----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
13*:											
Guben	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Rock outcrop.											
14*, 15*:											
Casmos	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rock outcrop.											
16 Chipeta	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
17*:											
Chipeta	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Badland.											
18*:											
Chipeta	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Persayo	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
19 Chupadera	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
20*:											
Comodore	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Poor.
Datino Variant	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
21, 22 Croydon	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
23*:											
Curecanti	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Pathead	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Pathead	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
24 Datino Variant	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
25* Doney	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
26* Doney	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
27*:											
Doney	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
27*:											
Podo	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
28*:											
Doney	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Toze	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
29*.											
Dumps											
30*:											
Falcon	Very poor.	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											
31 Ferron	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair	Poor.
32*:											
Frandsen	Poor	Poor	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
Gullied land.											
33*, 34*:											
Gerst	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Badland.											
Rubbleland.											
35*:											
Gerst	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Badland.											
Stormitt	Very poor.	Very poor.	Very poor.	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
36*, 37*:											
Gerst.											
Strych	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Badland.											
38*:											
Gerst	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Travessilla	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
39*, 40* Glenberg	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
98---------- Sagers	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
99---------- Saltair	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Good	Very poor.	Very poor.	Fair	Very poor.
100, 101---------- Senchert	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
102*:											
Senchert----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Senchert family---	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
103*:											
Senchert----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Toze----------	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
104*---------- Senchert	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
105*:											
Senchert family---	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Senchert----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
106*:											
Sheepcan----------	Very poor.	Very poor.	Very poor.	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Podo----------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rock outcrop.											
107*:											
Shupert----------	Poor	Fair	Fair	Poor	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Winetti----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
108---------- Silas	Very poor.	Very poor.	Good	Good	Good	Fair	Poor	Poor	Good	Poor	Good.
109*:											
Silas----------	Very poor.	Very poor.	Good	Good	Good	Fair	Poor	Poor	Good	Poor	Good.
Brycan----------	Poor	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Good	Very poor.	Fair.
110---------- Stormitt	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
111*:											
Stormitt----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
111*:											
Minchey	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Good.
112, 113, 114 Strych	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
115 Trag	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
116*:											
Trag	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Beje	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rottulee	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
117*:											
Trag	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Beje	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Senchert	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
118*:											
Trag	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Croydon	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
119 Travessilla	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
120*:											
Travessilla	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Rock outcrop.											
121*:											
Travessilla	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											
Gerst	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
122*:											
Travessilla	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Travessilla family	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
Rock outcrop.											

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
123*---------- Travessilla	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
124*:											
Uinta----------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Podo----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Poor.
125*:											
Uinta----------	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Toze----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
126---------- Winetti Variant	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
14*, 15*: Rock outcrop.											
16---------- Chipeta	0-2	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-95	35-45	10-20
	2-17	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	95-100	90-95	35-45	15-20
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
17*: Chipeta---------	0-5	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-95	35-45	10-20
	5-17	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	95-100	90-95	35-45	15-20
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
18*: Chipeta---------	0-5	Silty clay loam	CL, ML	A-6, A-7	0	100	100	95-100	90-95	35-45	10-20
	5-17	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	95-100	90-95	35-45	15-20
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Persayo---------	0-3	Loam----------	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	3-12	Loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
19---------- Chupadera	0-6	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-25	NP-5
	6-28	Loam----------	CL-ML	A-4	0	100	95-100	80-90	60-70	20-30	5-10
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
20*: Comodore--------	0-6	Very stony fine sandy loam.	SM, SM-SC, GM, GM-GC	A-2, A-4	50-60	65-80	60-75	45-55	30-40	20-25	NP-5
	6-14	Very stony loam	GM-GC	A-4	40-45	65-75	60-70	50-60	40-50	25-30	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Datino Variant--	0-9	Extremely stony fine sandy loam.	GM-GC, SM-SC	A-1, A-2	45-60	50-70	30-50	20-40	10-25	20-30	5-10
	9-16	Very stony loam	GM-GC	A-4	40-45	65-75	60-70	50-60	40-50	20-30	5-10
	16-60	Very stony fine sandy loam.	GM-GC, SM-SC	A-2, A-4	50-60	65-80	60-75	45-55	30-40	20-30	5-10
21, 22---------- Croydon	0-23	Loam----------	CL	A-6	0	85-100	80-100	55-100	50-80	20-30	10-15
	23-48	Clay loam--------	CL	A-6	0	85-100	80-100	70-100	55-80	20-40	10-15
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
23*: Curecanti-------	0-7	Loam----------	CL-ML	A-4	0	85-95	80-90	65-75	50-60	20-30	5-10
	7-60	Very stony loam, very cobbly loam very cobbly sandy clay loam.	SC, SM-SC, GC, GM-GC	A-6, A-4	45-50	60-80	55-75	50-60	35-45	25-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
23*:											
Pathead---------	0-4	Extremely bouldery fine sandy loam.	GM-GC, GM, GP-GM	A-2, A-1	65-80	40-55	35-50	25-45	10-35	20-30	NP-10
	4-38	Extremely cobbly loam, very cobbly loam, very stony fine sandy loam.	GM-GC, SM-SC	A-2, A-4	40-65	35-80	30-75	25-50	15-40	20-35	5-10
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pathead---------	0-3	Extremely stony loam.	GM-GC, GM, GP-GM	A-2, A-1	65-80	40-55	35-50	25-45	10-35	20-30	NP-10
	3-26	Extremely cobbly loam, very cobbly loam, very stony loam. sandy loam.	GM-GC, SM-SC	A-2, A-4	40-65	35-80	30-75	25-50	15-40	20-35	5-10
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
24---------- Datino Variant	0-4	Very stony loam	GM-GC, SM-SC	A-2, A-4	15-75	60-80	55-75	40-70	20-55	20-30	5-10
	4-22	Very stony loam, very cobbly loam.	GM-GC	A-4	25-40	60-70	55-65	50-60	35-50	20-30	5-10
	22-60	Very cobbly loam, very stony fine sandy loam.	GM-GC, SM-SC	A-2, A-4	30-60	40-80	35-75	25-60	15-40	20-30	5-10
25*---------- Doney	0-4	Silt loam--------	CL-ML	A-4	0	100	100	90-100	70-90	25-30	5-10
	4-36	Loam, clay loam	ML, CL-ML	A-4, A-6	0	85-95	80-90	70-80	55-65	25-35	5-15
	36	Weathered bedrock	---	---	---	---	---	---	---	---	---
26*---------- Doney	0-4	Stony loam-------	CL-ML	A-4	10-25	85-95	80-90	65-75	50-60	25-30	5-10
	4-35	Loam----------	CL-ML	A-4	0	85-95	80-90	65-75	50-60	25-30	5-10
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
27*:											
Doney----------	0-4	Stony loam-------	CL-ML	A-4	10-25	85-95	80-90	65-75	50-60	25-30	5-10
	4-35	Loam----------	CL-ML	A-4	0	85-95	80-90	65-75	50-60	25-30	5-10
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Podo----------	0-5	Very stony loam	SM-SC, SM	A-2, A-4	30-40	60-75	55-65	35-60	20-40	20-30	NP-10
	5-16	Gravelly sandy loam, loam, gravelly loam.	CL-ML, CL, GM, GC	A-2, A-4, A-6	0-10	60-95	55-90	40-75	20-70	20-35	NP-15
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28*:											
Doney----------	0-4	Stony loam-------	CL-ML	A-4	10-25	85-95	80-90	65-75	50-60	25-30	5-10
	4-35	Loam----------	CL-ML	A-4	0	85-95	80-90	65-75	50-60	25-30	5-10
	35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Toze----------	0-9	Loam----------	CL	A-6	0	95-100	90-100	80-95	60-75	25-30	10-15
	9-44	Cobbly silt loam, gravelly silt loam, loam.	CL	A-6	0-20	75-90	70-85	65-85	50-70	25-35	10-15
	44-60	Very gravelly fine sandy loam, gravelly very fine sandy loam.	GM-GC, SM-SC	A-2	5-15	50-70	45-65	30-60	20-35	20-30	5-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
29*. Dumps											
30*:											
Falcon----------	0-5	Stony sandy loam	SM	A-2, A-4	15-20	90-100	85-100	55-65	30-40	20-25	NP-5
	5-12	Sandy loam--------	SM, SM-SC	A-2, A-4	0-10	100	95-100	55-65	30-40	20-30	NP-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
31---------- Ferron	0-3	Silt loam---------	CL-ML	A-4	0	100	100	100	75-90	20-30	5-10
	3-60	Loam, very fine sandy loam.	CL-ML	A-4	0	100	100	100	70-85	20-30	5-10
32*:											
Frandsen---------	0-4	Loam----------	CL-ML	A-4	0-5	90-100	85-100	70-95	55-75	25-30	5-10
	4-40	Loam, clay loam	CL-ML, CL	A-4, A-6	0-5	90-100	85-100	70-95	55-80	25-40	5-15
	40-60	Fine sandy loam	SM, ML, CL-ML	A-4	0	100	100	70-85	40-55	20-30	NP-10
Gullied land.											
33*, 34*:											
Gerst----------	0-7	Extremely stony loam.	GM-GC	A-2	50-65	35-40	30-35	25-30	20-25	25-30	5-10
	7-19	Channery silt loam.	CL, CL-ML	A-4, A-6	0	75-80	70-75	65-75	50-65	25-35	5-15
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
Rubbleland.											
35*:											
Gerst----------	0-2	Cobbly loam------	GM, GM-GC, SM-SC, SM	A-2, A-4	0-25	60-90	55-85	40-65	30-50	25-35	NP-10
	2-17	Channery loam, channery clay loam, channery silt loam.	GM, GC, SM SC	A-2, A-4, A-6, A-7	0-10	60-80	55-75	40-70	30-50	30-45	5-20
	17	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
Stormitt---------	0-1	Gravelly sandy clay loam.	SM-SC,	A-2	0-10	65-80	60-75	50-70	25-35	25-35	5-10
	1-9	Gravelly sandy clay loam.	JM-JC	A-2	0-10	60-80	55-75	45-70	25-35	25-35	5-10
	9-60	Very cobbly sandy clay loam.	GM-GC, SM-SC	A-2	30-45	55-65	50-60	40-50	20-30	25-35	5-10
36*, 37*:											
Gerst----------	0-7	Extremely stony loam.	GM-GC	A-2	50-65	35-40	30-35	25-30	20-25	25-30	5-10
	7-19	Channery silt loam.	CL, CL-ML	A-4, A-6	0	75-80	70-75	65-75	50-65	25-35	5-15
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
Strych----------	0-5	Very stony loam	SM, SM-SC	A-4, A-2	30-45	85-100	75-95	55-80	30-50	20-25	NP-10
	5-60	Very stony loam, very stony sandy loam, very cobbly sandy loam.	SM-SC, GM-GC	A-4, A-2	20-40	60-85	50-80	40-65	20-45	25-30	5-10

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
106*:											
Sheepcan--------	0-9	Stony loam--------	CL-ML, SM-SC	A-4	15-30	75-85	70-80	60-75	40-60	25-35	5-10
	9-28	Gravelly clay loam, cobbly clay loam.	CL	A-6	5-30	70-80	65-75	60-70	50-55	30-40	10-20
	28-60	Very cobbly clay loam.	GC	A-6	20-40	55-65	50-65	45-60	35-50	30-40	10-20
Podo----------	0-1	Gravelly loam----	SM-SC	A-2, A-4	5-20	60-80	55-70	35-70	20-45	20-30	5-10
	1-8	Gravelly sandy loam, loam, gravelly loam.	CL-ML, CL, GM, GC	A-2, A-4, A-6	0-10	60-95	55-90	40-75	20-70	20-35	NP-15
	8	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
107*:											
Shupert---------	0-3	Gravelly loam----	GM-GC	A-4	0	60-70	55-65	45-55	35-45	20-30	5-10
	3-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-95	70-85	25-40	5-15
Winetti---------	0-6	Bouldery sandy loam.	SM	A-2, A-4	35-45	95-100	90-100	55-70	30-40	20-25	NP-5
	6-11	Loam----------	CL-ML, ML	A-4	0	90-100	85-95	70-90	55-70	20-30	NP-10
	11-34	Very bouldery loam.	CL-ML, ML	A-4	40-45	75-85	70-80	60-70	45-55	20-30	NP-10
	34-60	Very gravelly sandy loam.	GM-GC, GM	A-2	15-20	40-50	35-45	20-30	15-20	20-30	NP-10
108---------- Silas	0-28	Loam----------	CL-ML, ML	A-4	0	95-100	90-100	85-95	60-75	25-35	5-10
	28-60	Loam, sandy clay loam.	CL-ML	A-4	0	95-100	90-100	75-85	50-60	25-30	5-10
109*:											
Silas----------	0-28	Loam----------	CL-ML, ML	A-4	0	95-100	90-100	85-95	60-75	25-35	5-10
	28-60	Loam, sandy clay loam.	CL-ML	A-4	0	95-100	90-100	75-85	50-60	25-30	5-10
Brycan----------	0-12	Loam----------	CL-ML, ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	12-32	Loam----------	CL-ML, ML	A-4	0	95-100	90-100	75-95	65-75	25-35	5-10
	32-60	Silt loam--------	CL-ML, ML	A-4	0	90-100	85-100	75-100	70-90	25-35	5-10
110---------- Stormitt	0-1	Gravelly sandy clay loam.	SM-SC, SM	A-2	0-10	65-80	60-75	50-70	25-35	25-35	5-10
	1-9	Gravelly sandy clay loam.	SM-SC, SM	A-2	0-10	60-80	55-75	45-70	25-35	25-35	5-10
	9-60	Very cobbly sandy clay loam.	GM-GC, GM, SM-SC, SM	A-2	30-45	55-65	50-60	40-50	20-30	25-35	5-10
111*:											
Stormitt--------	0-1	Gravelly sandy clay loam.	SM-SC, SM	A-2	0-10	65-80	60-75	50-70	25-35	25-35	5-10
	1-9	Gravelly sandy clay loam.	SM-SC, SM	A-2	0-10	60-80	55-75	45-70	25-35	25-35	5-10
	9-60	Very cobbly sandy clay loam.	GM-GC, GM, SM-SC, SM	A-2	30-45	55-65	50-60	40-50	20-30	25-35	5-10
Minchey---------	0-3	Loam----------	CL-ML, CL	A-4, A-6	0	95-100	90-95	80-90	60-80	20-35	5-15
	3-32	Clay loam, sandy clay loam.	CL	A-6	0	95-100	90-95	70-95	55-80	30-40	10-20
	32-48	Gravelly sandy loam.	GM, SM	A-2, A-4	0-5	60-85	50-80	40-60	30-40	15-25	NP-5
	48-60	Very gravelly sandy loam.	GM	A-1	0-5	35-50	30-45	15-35	10-20	15-25	NP-5

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
112---------- Strych	0-3	Very bouldery fine sandy loam.	SM, SM-SC	A-4, A-2	30-45	85-100	75-95	55-80	30-50	20-25	NP-10
	3-60	Very stony loam, very stony sandy loam, very cobbly sandy loam.	SM-SC, GM-GC	A-4, A-2	20-40	60-85	50-80	40-65	20-45	25-30	5-10
113---------- Strych	0-5	Very stony loam	SM, SM-SC	A-4, A-2	30-45	85-100	75-95	55-80	30-50	20-25	NP-10
	5-60	Very stony loam, very stony sandy loam, very cobbly sandy loam.	SM-SC GM-GC	A-2, A-4	20-40	60-85	50-80	40-65	20-45	25-30	5-10
114---------- Strych	0-3	Very stony loam	SM, SM-SC	A-4, A-2	30-45	85-100	75-95	55-80	30-50	20-25	NP-10
	3-60	Very stony loam, very stony sandy loam, very cobbly sandy loam.	SM-SC, GM-GC	A-4, A-2	20-40	60-85	50-80	40-65	20-45	25-30	5-10
115---------- Trag	0-10	Stony loam--------	CL-ML	A-4	30-40	95-100	90-100	75-85	55-70	25-30	5-10
	10-60	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	95-100	85-100	45-85	30-40	10-20
116*:											
Trag----------	0-5	Loam----------	ML, CL-ML, SM, SM-SC	A-4	0-5	95-100	90-100	75-90	40-60	20-30	NP-10
	5-60	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	95-100	85-100	45-85	30-40	10-20
Beje----------	0-6	Loam----------	CL-ML	A-4	0-10	90-100	85-100	75-95	55-75	20-35	5-10
	6-14	Clay loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-95	50-80	25-35	5-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rottulee--------	0-2	Loam----------	CL-ML	A-4	0	95-100	90-95	75-85	55-70	25-30	5-10
	2-15	Loam, clay loam	CL, CL-ML	A-4, A-6	0	95-100	90-95	75-90	60-75	25-35	5-15
	15-34	Gravelly silty clay loam, gravelly silt loam.	CL	A-6	0	70-80	65-75	60-70	55-65	30-35	10-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
117*:											
Trag----------	0-5	Clay loam--------	CL	A-6	0-5	95-100	90-100	80-90	65-80	30-35	10-15
	5-60	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	95-100	85-100	45-85	30-40	10-20
Beje----------	0-6	Loam----------	CL-ML	A-4	0-10	90-100	85-100	75-95	55-75	20-35	5-10
	6-14	Clay loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-10	90-100	85-100	70-95	50-80	25-35	5-15
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Senchert--------	0-4	Loam----------	CL-ML	A-4	0	100	95-100	80-95	60-75	20-30	5-10
	4-16	Loam----------	CL-ML	A-4	0	100	95-100	80-95	60-75	20-30	5-10
	16-35	Clay loam, loam	ML	A-4, A-6	0-10	95-100	90-100	80-100	60-80	30-40	5-15
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
118*:											
Trag----------	0-10	Stony loam-------	CL-ML	A-4	30-40	95-100	90-100	75-85	55-70	25-30	5-10
	10-60	Sandy clay loam, silty clay loam, clay loam.	CL, SC	A-6	0	100	95-100	85-100	45-85	30-40	10-20
Croydon---------	0-23	Loam----------	CL	A-6	0	85-100	80-100	55-100	50-80	20-30	10-15
	23-48	Clay loam--------	CL	A-6	0	85-100	80-100	70-100	55-80	20-40	10-15
	48	Weathered bedrock	---	---	---	---	---	---	---	---	---
119---------- Travessilla	0-3	Sandy loam-------	SM-SC, SM	A-2, A-4	0-10	90-100	85-100	55-80	30-40	20-25	NP-10
	3-17	Loam, very fine sandy loam.	CL-ML	A-4	0-5	90-100	85-100	75-95	50-75	20-30	5-10
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
120*:											
Travessilla-----	0-2	Fine sandy loam	SM	A-2, A-4	0-5	90-100	90-100	60-80	30-50	15-25	NP-5
	2-10	Fine sandy loam, sandy loam, loam.	SM-SC, SM, CL-ML, ML	A-2, A-4	0-10	85-100	80-100	60-90	30-60	15-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
121*:											
Travessilla-----	0-2	Extremely bouldery loam.	GM-GC	A-2	55-65	40-50	35-45	30-40	25-30	20-30	5-10
	2-12	Loam, very fine sandy loam.	CL-ML	A-4	0-5	90-100	85-100	75-95	50-75	20-30	5-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Gerst----------	0-5	Very channery loam.	GM, GM-GC, SM-SC, SM	A-2, A-4	0-25	60-90	55-85	40-65	30-50	25-35	NP-10
	5-19	Channery loam, channery clay loam, channery silt loam.	GM, GC, SM SC	A-2, A-4, A-6, A-7	0-10	60-80	55-75	40-70	30-50	30-45	5-20
	19	Weathered bedrock	---	---	---	---	---	---	---	---	---
122*:											
Travessilla-----	0-2	Fine sandy loam	SM	A-2, A-4	0-5	90-100	90-100	60-80	30-50	15-25	NP-5
	2-10	Fine sandy loam, sandy loam, loam.	SM-SC, SM, CL-ML, ML	A-2, A-4	0-10	85-100	80-100	60-90	30-60	15-30	NP-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Travessilla family---------	0-4	Channery sandy loam.	SM	A-2, A-4	5-15	85-100	60-80	45-60	25-40	15-25	NP-5
	4-13	Sandy loam-------	SM-SC, SM	A-2, A-4	0	90-100	90-100	45-70	25-40	20-30	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
123*---------- Travessilla	0-4	Channery sandy loam.	SM	A-2, A-4	5-15	85-100	60-80	45-60	25-40	15-25	NP-5
	4-13	Sandy loam-------	SM-SC, SM	A-2, A-4	0	90-100	90-100	45-70	25-40	20-30	NP-10
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
124*:											
Uinta----------	0-3	Loam----------	CL-ML	A-4	0-15	100	95-100	80-95	60-75	25-30	5-10
	3-11	Stony sandy loam	SM	A-2, A-4	15-25	85-90	75-85	50-60	25-40	20-25	NP-5
	11-42	Stony clay loam	CL	A-6	25-35	75-85	70-80	65-80	50-65	30-40	15-25
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Podo----------	0-5	Cobbly loam------	SM-SC	A-2, A-4	5-20	60-80	55-70	35-70	20-45	20-30	5-10
	5-11	Gravelly sandy loam, loam, gravelly loam.	CL-ML, CL, GM, GC	A-2, A-4, A-6	0-10	60-95	55-90	40-75	20-70	20-35	NP-15
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
125*:											
Uinta----------	0-3	Loam----------	CL-ML	A-4	0-15	100	95-100	80-95	60-75	25-30	5-10
	3-11	Stony sandy loam	SM	A-2, A-4	15-25	85-90	75-85	50-60	25-40	20-25	NP-5
	11-42	Stony clay loam	CL	A-6	25-35	75-85	70-80	65-80	50-65	30-40	15-25
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Toze----------	0-3	Fine sandy loam	SM-SC, CL-ML, SM ML	A-4	0-5	95-100	90-100	65-85	35-55	20-30	NP-10
	3-32	Cobbly silt loam, gravelly silt loam, loam.	CL	A-6	0-20	75-90	70-85	65-85	50-70	25-35	10-15
	32-60	Very gravelly fine sandy loam, gravelly very fine sandy loam.	GM-GC, SM-SC	A-2	5-15	50-70	45-65	30-60	20-35	20-30	5-10
126---------- Winetti Variant	0-3	Cobbly fine sandy loam.	SM	A-2, A-4	20-25	85-90	80-85	55-75	30-50	---	NP
	3-18	Stratified sand to fine sandy loam.	SM	A-2	0	100	100	50-85	15-30	---	NP
	18-53	Extremely gravelly sand.	GP	A-1	20-30	25-35	20-30	10-20	0-5	---	NP
	53-60	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	---	NP

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm_	In/hr	In/in	pH	mmhos/cm					Pct
12*:												
Cabba----------	0-2	28-33	1.20-1.30	0.6-2.0	0.09-0.11	7.4-7.8	<2	Low--------	0.10	1	8	1-3
	2-8	18-35	1.25-1.35	0.6-2.0	0.12-0.18	7.4-8.4	<2	Low--------	0.43			
	8	---	---	---	---	---	---	----------	----			
Badland.												
Rock outcrop.												
13*:												
Cabba----------	0-3	20-25	1.20-1.30	0.6-2.0	0.12-0.13	7.4-7.8	<2	Low--------	0.17	1	8	1-3
	3-15	18-35	1.25-1.35	0.6-2.0	0.12-0.18	7.4-8.4	<2	Low--------	0.43			
	15	---	---	---	---	---	---	----------	----			
Guben----------	0-7	15-20	1.20-1.30	0.6-6.0	0.04-0.06	7.4-8.4	<2	Low--------	0.10	1	8	3-5
	7-15	17-22	1.30-1.40	0.6-2.0	0.08-0.10	7.4-8.4	<2	Low--------	0.15			
	15-60	17-25	1.25-1.45	0.6-6.0	0.06-0.08	7.9-9.0	<2	Low--------	0.10			
Rock outcrop.												
14*, 15*:												
Casmos----------	0-2	18-27	1.25-1.35	0.6-2.0	0.11-0.13	7.9-9.0	2-4	Low--------	0.20	1	8	<1
	2-6	18-35	1.40-1.50	0.6-2.0	0.14-0.18	8.5-9.0	2-4	Low--------	0.32			
	6	---	---	---	---	---	---	----------	----			
Rock outcrop.												
16---------- Chipeta	0-2	28-47	1.15-1.25	0.06-0.2	0.11-0.16	7.4-8.4	8-16	Moderate	0.43	1	4L	<2
	2-17	35-45	1.15-1.25	0.06-0.2	0.11-0.16	7.4-9.0	8-16	Moderate	0.43			
	17	---	---	---	---	---	---	----------	----			
17*:												
Chipeta----------	0-5	28-47	1.15-1.25	0.06-0.2	0.11-0.16	7.4-8.4	8-16	Moderate	0.43	1	4L	<2
	5-17	35-45	1.15-1.25	0.06-0.2	0.11-0.16	7.4-9.0	8-16	Moderate	0.43			
	17	---	---	---	---	---	---	----------	----			
Badland.												
18*:												
Chipeta----------	0-5	28-47	1.15-1.25	0.06-0.2	0.11-0.16	7.4-8.4	8-16	Moderate	0.43	1	4L	<2
	5-17	35-45	1.15-1.25	0.06-0.2	0.11-0.16	7.4-9.0	8-16	Moderate	0.43			
	17	---	---	---	---	---	---	----------	----			
Persayo----------	0-3	18-27	1.20-1.30	0.6-2.0	0.15-0.17	8.5-9.0	<8	Moderate	0.37	1	4L	.5-1
	3-12	20-30	1.10-1.20	0.2-0.6	0.16-0.18	8.5-9.0	<8	Moderate	0.49			
	12	---	---	---	---	---	---	----------	----			
19---------- Chupadera	0-6	10-12	1.30-1.35	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low--------	0.32	2	3	1-3
	6-28	14-17	1.25-1.35	2.0-6.0	0.15-0.18	7.9-8.4	<2	Low--------	0.49			
	28	---	---	---	---	---	---	----------	----			
20*:												
Comodore----------	0-6	10-15	1.30-1.40	2.0-6.0	0.08-0.09	7.4-7.8	<2	Low--------	0.10	1	8	3-5
	6-14	19-24	1.20-1.30	0.6-2.0	0.09-0.10	7.4-7.8	<2	Low--------	0.10			
	14	---	---	---	---	---	---	----------	----			
Datino Variant--	0-9	12-18	1.25-1.35	0.6-2.0	0.06-0.09	7.4-7.8	<2	Low--------	0.02	1	8	3-5
	9-16	18-26	1.20-1.30	0.6-2.0	0.09-0.11	7.4-8.4	<2	Low--------	----			
	16-60	16-25	1.30-1.40	2.0-6.0	0.06-0.10	7.4-8.4	<2	Low--------	----			
21, 22---------- Croydon	0-23	18-27	1.30-1.40	0.6-2.0	0.13-0.18	5.6-6.5	<2	Moderate	0.24	3	5	5-10
	23-48	27-35	1.40-1.50	0.2-0.6	0.16-0.18	6.1-6.5	<2	Moderate	0.32			
	48	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm					Pct
23*:												
Curecanti	0-7	15-18	1.25-1.30	0.6-2.0	0.14-0.16	6.6-7.3	<2	Low	0.28	1	5	3-5
	7-60	18-27	1.25-1.30	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low	0.10			
Pathead	0-4	13-21	1.20-1.35	0.6-6.0	0.04-0.06	7.9-8.4	<2	Low	0.05	1	8	1-3
	4-38	18-27	1.35-1.45	0.6-2.0	0.05-0.08	7.9-9.0	<2	Low	0.10			
	38	---	---	---	---	---	---	---	---			
Pathead	0-3	13-21	1.20-1.35	0.6-6.0	0.04-0.06	7.9-8.4	<2	Low	0.05	1	8	1-3
	3-26	18-27	1.35-1.45	0.6-2.0	0.05-0.08	7.9-9.0	<2	Low	0.10			
	26	---	---	---	---	---	---	---	---			
24 Datino Variant	0-4	15-20	1.25-1.35	0.6-6.0	0.06-0.09	7.4-7.8	<2	Low	0.02	1	8	3-5
	4-22	18-26	1.20-1.30	0.6-2.0	0.09-0.11	7.4-8.4	<2	Low	0.05			
	22-60	16-25	1.30-1.45	0.6-6.0	0.06-0.10	7.4-8.4	<2	Low	0.05			
25* Doney	0-4	18-22	1.10-1.20	0.2-0.6	0.17-0.19	7.9-8.4	<2	Low	0.37	2	4L	1-2
	4-36	18-30	1.20-1.30	0.6-2.0	0.16-0.18	8.5-9.0	<2	Moderate	0.37			
	36	---	---	---	---	---	---	---	---			
26* Doney	0-4	15-17	1.20-1.30	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low	0.20	2	8	1-3
	4-35	22-24	1.20-1.30	0.6-2.0	0.14-0.16	8.5-9.0	<2	Low	0.37			
	35	---	---	---	---	---	---	---	---			
27*:												
Doney	0-4	15-17	1.20-1.30	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low	0.20	2	8	1-3
	4-35	22-24	1.20-1.30	0.6-2.0	0.14-0.16	8.5-9.0	<2	Low	0.37			
	35	---	---	---	---	---	---	---	---			
Podo	0-5	12-22	1.15-1.25	2.0-6.0	0.06-0.10	7.9-8.4	<2	Low	0.10	1	8	1-3
	5-16	13-27	1.35-1.45	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low	0.17			
	16	---	---	---	---	---	---	---	---			
28*:												
Doney	0-4	15-17	1.20-1.30	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low	0.20	2	8	1-3
	4-35	22-24	1.20-1.30	0.6-2.0	0.14-0.16	8.5-9.0	<2	Low	0.37			
	35	---	---	---	---	---	---	---	---			
Toze	0-9	18-25	1.20-1.30	0.6-2.0	0.14-0.20	7.9-8.4	<2	Moderate	0.24	5	4L	3-5
	9-44	18-27	1.25-1.35	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.24			
	44-60	15-20	1.40-1.50	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low	0.10			
29*. Dumps												
30*:												
Falcon	0-5	8-15	1.30-1.35	6.0-20	0.08-0.10	6.6-7.3	<2	Low	0.10	1	8	3-5
	5-12	10-17	1.30-1.35	6.0-20	0.10-0.12	6.6-7.3	<2	Low	0.10			
	12	---	---	---	---	---	---	---	---			
Rock outcrop.												
31 Ferron	0-3	20-25	1.20-1.25	0.6-2.0	0.13-0.16	7.4-8.4	2-8	Low	0.49	5	8	2-4
	3-60	12-18	1.30-1.35	0.6-2.0	0.13-0.16	7.4-8.4	2-8	Low	0.49			
32*:												
Frandsen	0-4	20-27	1.30-1.40	0.6-2.0	0.15-0.17	7.9-9.0	<4	Low	0.32	5	4L	1-3
	4-40	20-35	1.30-1.40	0.6-2.0	0.15-0.18	7.9-9.0	<4	Moderate	0.32			
	40-60	10-18	1.40-1.50	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low	0.37			
Gullied land.												
33*, 34*:												
Gerst	0-7	18-24	1.20-1.30	0.6-2.0	0.08-0.10	7.9-8.4	<2	Low	0.05	1	8	1-3
	7-19	18-27	1.20-1.30	0.2-0.6	0.13-0.15	8.5-9.0	<2	Low	0.24			
	19	---	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm					Pct
93*:												
Ravola----------	0-8	15-25	1.30-1.35	0.6-2.0	0.13-0.17	7.4-8.4	2-8	Low--------	0.49	5	4L	1-3
	8-60	18-25	1.25-1.30	0.6-2.0	0.13-0.17	7.4-9.0	2-8	Low--------	0.49			
Slickspots.												
94*. Riverwash												
95*. Rock outcrop												
96*: Rock outcrop.												
Rubbleland.												
Travessilla-----	0-3	12-18	1.30-1.40	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low--------	0.10	2	8	1-2
	3-17	13-18	1.30-1.40	0.6-6.0	0.13-0.16	7.4-8.4	<2	Low--------	0.37			
	17	---	---	---	---	---	---	----------	----			
97*:												
Rottulee--------	0-2	17-23	1.20-1.30	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	0.20	2	4L	3-5
	2-15	24-30	1.20-1.30	0.6-2.0	0.16-0.18	7.9-8.4	<2	Moderate	0.24			
	15-34	26-32	1.10-1.20	0.6-2.0	0.14-0.16	8.5-9.0	<2	Moderate	0.20			
	34	---	---	---	---	---	---	----------	----			
Trag----------	0-10	20-25	1.20-1.30	0.6-2.0	0.12-0.13	7.4-7.8	<2	Low--------	0.17	1	8	3-5
	10-60	24-35	1.30-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.43			
98---------- Sagers	0-7	27-30	1.15-1.25	0.2-0.6	0.16-0.18	7.4-9.0	2-8	Moderate	0.43	5	6	<1
	7-60	27-35	1.15-1.25	0.2-0.6	0.15-0.18	7.9-9.0	2-8	Moderate	0.43			
99---------- Saltair	0-7	25-40	1.20-1.25	0.2-0.6	0.01-0.08	7.9-9.0	>16	Low--------	0.49	5	4L	1-3
	7-60	25-35	1.20-1.25	0.06-0.2	0.01-0.08	7.9-9.0	>16	Moderate	0.49			
100, 101--------- Senchert	0-4	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.3	<2	Low--------	0.24	3	5	5-10
	4-16	18-27	1.25-1.35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low--------	0.37			
	16-35	24-35	1.30-1.50	0.6-2.0	0.15-0.18	6.6-7.8	<2	Moderate	0.37			
	35	---	---	---	---	---	---	----------	----			
102*:												
Senchert--------	0-3	10-20	1.25-1.40	0.6-2.0	0.10-0.13	6.6-7.3	<2	Low--------	0.28	3	3	5-10
	3-21	18-27	1.25-1.35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low--------	0.37			
	21	---	---	---	---	---	---	----------	----			
Senchert family-	0-11	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.3	<2	Low--------	0.24	3	5	5-10
	11-23	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	<2	Low--------	0.24			
	23-35	28-35	1.25-1.35	0.2-0.6	0.15-0.20	6.6-7.8	<2	Moderate	0.32			
	35	---	---	---	---	---	---	----------	----			
103*:												
Senchert--------	0-4	14-20	1.25-1.35	0.6-2.0	0.16-0.19	6.6-7.3	<2	Low--------	0.24	3	5	5-10
	4-18	28-35	1.25-1.35	0.2-0.6	0.15-0.20	6.6-7.3	<2	Moderate	0.32			
	18-25	40-45	1.20-1.25	0.2-0.6	0.16-0.20	6.6-7.8	<2	High-------	0.37			
	25	---	---	---	---	---	---	----------	----			
Toze----------	0-3	18-25	1.20-1.30	0.6-2.0	0.14-0.20	7.9-8.4	<2	Moderate	0.24	5	4L	3-5
	3-33	18-27	1.25-1.35	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.24			
	33-60	15-20	1.40-1.50	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low--------	0.10			
104*---------- Senchert	0-11	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.3	<2	Low--------	0.24	3	5	5-10
	11-23	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.8	<2	Low--------	0.24			
	23-35	28-35	1.25-1.35	0.2-0.6	0.15-0.20	6.6-7.8	<2	Moderate	0.32			
	35	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm					Pct
105*:												
Senchert family-	0-8	10-20	1.25-1.40	0.6-2.0	0.14-0.16	6.6-7.3	<2	Low--------	0.32	3	3	5-10
	8-27	28-35	1.25-1.35	0.2-0.6	0.15-0.20	6.6-7.8	<2	Moderate	0.32			
	27	---	---	---	---	---	---	----------	----			
Senchert--------	0-4	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.3	<2	Low--------	0.24	3	5	5-10
	4-16	18-27	1.25-1.35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low--------	0.37			
	16-35	24-35	1.30-1.50	0.6-2.0	0.15-0.18	6.6-7.8	<2	Moderate	0.37			
	35	---	---	---	---	---	---	----------	----			
106*:												
Sheepcan--------	0-9	23-25	1.35-1.45	0.2-0.6	0.11-0.13	7.9-8.4	<2	Low--------	0.15	5	8	1-3
	9-28	28-35	1.30-1.40	0.2-0.6	0.12-0.14	8.5-9.0	<2	Moderate	0.17			
	28-60	28-35	1.30-1.40	0.2-0.6	0.09-0.11	7.9-9.0	<2	Low--------	0.10			
Podo----------	0-1	15-24	1.15-1.25	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low--------	0.15	1	8	1-3
	1-8	13-27	1.35-1.45	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low--------	0.17			
	8	---	---	---	---	---	---	----------	----			
Rock outcrop.												
107*:												
Shupert---------	0-3	15-20	1.20-1.30	0.6-2.0	0.11-0.13	7.9-8.4	<2	Low--------	0.24	5	8	1-2
	3-60	20-30	1.20-1.30	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate	0.49			
Winetti---------	0-6	8-13	1.30-1.40	2.0-6.0	0.06-0.08	7.4-7.8	<2	Low--------	0.15	2	8	1-3
	6-11	10-17	1.20-1.30	2.0-6.0	0.15-0.17	7.9-8.4	<2	Low--------	0.37			
	11-34	10-17	1.20-1.30	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low--------	0.10			
	34-60	10-16	1.30-1.40	2.0-6.0	0.05-0.07	7.9-8.4	<2	Low--------	0.10			
108----------	0-28	20-25	1.20-1.25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	5	6	5-10
Silas	28-60	18-25	1.20-1.25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low--------	----			
109*:												
Silas----------	0-28	20-25	1.20-1.25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.32	5	6	5-10
	28-60	18-25	1.20-1.25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low--------	----			
Brycan----------	0-12	18-27	1.20-1.30	0.6-2.0	0.15-0.17	7.4-8.4	<2	Moderate	0.28	5	5	2-4
	12-32	18-27	1.30-1.40	0.6-2.0	0.14-0.16	7.4-8.4	<2	Moderate	0.32			
	32-60	18-27	1.30-1.40	0.2-0.6	0.16-0.18	7.4-8.4	<2	Moderate	0.49			
110----------	0-1	20-27	1.30-1.40	0.6-2.0	0.12-0.15	7.4-7.8	<2	Low--------	0.15	2	8	1-3
Stormitt	1-9	20-27	1.30-1.40	0.6-2.0	0.12-0.15	7.4-8.4	<2	Low--------	0.15			
	9-60	20-27	1.30-1.40	0.6-2.0	0.08-0.11	7.9-9.0	<2	Low--------	0.10			
111*:												
Stormitt--------	0-1	20-27	1.30-1.40	0.6-2.0	0.12-0.15	7.4-7.8	<2	Low--------	0.15	2	8	1-3
	1-9	20-27	1.30-1.40	0.6-2.0	0.12-0.15	7.4-8.4	<2	Low--------	0.15			
	9-60	20-27	1.30-1.40	0.6-2.0	0.08-0.11	7.9-9.0	<2	Low--------	0.10			
Minchey---------	0-3	20-35	1.30-1.35	0.6-2.0	0.16-0.18	7.9-8.4	<4	Low--------	0.37	3	4L	.5-1
	3-32	30-35	1.30-1.35	0.6-2.0	0.17-0.19	7.9-8.4	<4	Moderate	0.32			
	32-48	10-15	1.40-1.45	2.0-6.0	0.07-0.09	7.9-8.4	<4	Low--------	0.15			
	48-60	10-15	1.40-1.45	2.0-6.0	0.06-0.08	7.9-8.4	<4	Low--------	0.10			
112----------	0-3	9-14	1.35-1.45	2.0-6.0	0.08-0.10	7.4-8.4	<2	Low--------	0.20	2	8	.5-3
Strych	3-60	14-18	1.45-1.60	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low--------	0.20			
113----------	0-5	9-14	1.35-1.45	2.0-6.0	0.08-0.10	7.4-8.4	<2	Low--------	0.20	2	8	.5-3
Strych	5-47	14-18	1.40-1.65	6.0-20	0.09-0.16	7.9-9.0	<2	Low--------	0.17			
114----------	0-3	9-14	1.35-1.45	2.0-6.0	0.08-0.10	7.4-8.4	<2	Low--------	0.20	2	8	.5-3
Strych	3-60	14-18	1.45-1.60	2.0-6.0	0.06-0.11	7.9-9.0	<2	Low--------	0.20			
115----------	0-10	20-25	1.20-1.30	0.6-2.0	0.12-0.13	7.4-7.8	<2	Low--------	0.17	1	8	3-5
Trag	10-60	24-35	1.30-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.43			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm					Pct
116*:												
Trag----------	0-5	11-24	1.30-1.45	0.6-6.0	0.12-0.17	7.4-7.8	<2	Moderate	0.24	4	3	3-5
	5-60	24-35	1.30-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.43			
Beje----------	0-6	24-27	1.20-1.30	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.28	1	6	3-5
	6-14	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	14	---	---	---	---	---	---	----------	----			
Rottulee--------	0-2	17-23	1.20-1.30	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low-------	0.20	2	4L	3-5
	2-15	24-30	1.20-1.30	0.6-2.0	0.16-0.18	7.9-8.4	<2	Moderate	0.24			
	15-34	26-32	1.10-1.20	0.6-2.0	0.14-0.16	8.5-9.0	<2	Moderate	0.20			
	34	---	---	---	---	---	---	----------	----			
117*:												
Trag----------	0-5	28-35	1.25-1.35	0.6-2.0	0.18-0.20	7.4-7.8	<2	Moderate	0.32	3	6	3-5
	5-60	24-35	1.30-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.43			
Beje----------	0-6	24-27	1.20-1.30	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.28	1	6	3-5
	6-14	18-35	1.30-1.40	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.37			
	14	---	---	---	---	---	---	----------	----			
Senchert--------	0-4	18-27	1.25-1.35	0.6-2.0	0.15-0.18	6.6-7.3	<2	Low-------	0.24	3	5	5-10
	4-16	18-27	1.25-1.35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Low-------	0.37			
	16-35	24-35	1.30-1.50	0.6-2.0	0.15-0.18	6.6-7.8	<2	Moderate	0.37			
	35	---	---	---	---	---	---	----------	----			
118*:												
Trag----------	0-10	20-25	1.20-1.30	0.6-2.0	0.12-0.13	7.4-7.8	<2	Low-------	0.17	1	8	3-5
	10-60	24-35	1.30-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.43			
Croydon---------	0-23	18-27	1.30-1.40	0.6-2.0	0.13-0.18	5.6-6.5	<2	Moderate	0.24	3	5	5-10
	23-48	27-35	1.40-1.50	0.2-0.6	0.16-0.18	6.1-6.5	<2	Moderate	0.32			
	48	---	---	---	---	---	---	----------	----			
119---------- Travessilla	0-3	10-16	1.30-1.40	2.0-6.0	0.11-0.15	7.4-7.8	<2	Low-------	0.20	2	3	1-2
	3-17	13-18	1.30-1.40	0.6-6.0	0.13-0.16	7.4-8.4	<2	Low-------	0.37			
	17	---	---	---	---	---	---	----------	----			
120*:												
Travessilla-----	0-2	3-13	1.45-1.60	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.28	2	3	.5-1
	2-10	8-18	1.30-1.45	0.6-6.0	0.12-0.16	7.4-9.0	<2	Low-------	0.32			
	10	---	---	---	---	---	---	----------	----			
Rock outcrop.												
121*:												
Travessilla-----	0-2	15-18	1.15-1.25	0.6-2.0	0.06-0.08	7.9-8.4	<2	Low-------	0.05	2	8	1-2
	2-12	13-18	1.30-1.40	0.6-6.0	0.13-0.16	7.4-8.4	<2	Low-------	0.37			
	12	---	---	---	---	---	---	----------	----			
Rock outcrop.												
Gerst----------	0-5	15-27	1.30-1.40	0.2-0.6	0.08-0.14	7.9-9.0	<2	Low-------	0.24	1	8	<1
	5-19	18-35	1.30-1.40	0.2-0.6	0.11-0.14	7.9-9.0	<2	Moderate	0.24			
	19	---	---	---	---	---	---	----------	----			
122*:												
Travessilla-----	0-2	3-13	1.45-1.60	2.0-6.0	0.09-0.13	7.4-8.4	<2	Low-------	0.28	2	3	.5-1
	2-10	8-18	1.30-1.45	0.6-6.0	0.12-0.16	7.4-9.0	<2	Low-------	0.32			
	10	---	---	---	---	---	---	----------	----			
Travessilla family---------	0-4	6-13	1.45-1.60	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low-------	0.15	2	8	.5-1
	4-13	8-18	1.35-1.45	2.0-6.0	0.09-0.12	7.4-8.4	<2	Low-------	0.24			
	13	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	G/cm	In/hr	In/in	pH	mmhos/cm					Pct
122*: Rock outcrop.												
123*---------- Travessilla	0-4	6-13	1.45-1.60	2.0-6.0	0.10-0.14	7.4-8.4	<2	Low--------	0.15	2	8	.5-1
	4-13	8-18	1.35-1.45	2.0-6.0	0.09-0.12	7.4-8.4	<2	Low--------	0.24			
	13	---	---	---	---	---	---	----------	----			
124*:												
Uinta----------	0-3	18-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low--------	0.24	4	5	5-10
	3-11	7-15	1.30-1.40	2.0-6.0	0.08-0.09	6.6-7.3	<2	Low--------	0.15			
	11-42	30-35	1.40-1.50	0.2-0.6	0.12-0.15	6.6-7.8	<2	Low--------	0.10			
	42	---	---	---	---	---	---	----------	----			
Podo----------	0-5	15-24	1.15-1.25	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low--------	0.15	1	8	1-3
	5-11	13-27	1.35-1.45	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low--------	0.17			
	11	---	---	---	---	---	---	----------	----			
125*:												
Uinta----------	0-3	18-22	1.15-1.25	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low--------	0.24	4	5	5-10
	3-11	7-15	1.30-1.40	2.0-6.0	0.08-0.09	6.6-7.3	<2	Low--------	0.15			
	11-42	30-35	1.40-1.50	0.2-0.6	0.12-0.15	6.6-7.8	<2	Low--------	0.10			
	42	---	---	---	---	---	---	----------	----			
Toze----------	0-3	12-18	1.25-1.35	2.0-6.0	0.10-0.14	7.4-7.8	<2	Low--------	0.15	5	3	5-10
	3-32	18-27	1.25-1.35	0.6-2.0	0.12-0.20	7.4-8.4	<2	Moderate	0.24			
	32-60	15-20	1.40-1.50	2.0-6.0	0.08-0.10	7.9-8.4	<2	Low--------	0.10			
126---------- Winetti Variant	0-3	7-11	1.30-1.40	2.0-6.0	0.09-0.10	>9.0	<4	Low--------	0.20	1	8	1-3
	3-18	1-5	1.45-1.55	2.0-6.0	0.06-0.10	>9.0	<4	Low--------	0.28			
	18-53	2-6	1.50-1.60	>20	0.02-0.03	7.9-8.4	<4	Low--------	0.05			
	53-60	3-7	1.40-1.50	2.0-6.0	0.10-0.13	7.9-8.4	<4	Low--------	0.28			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
1---------- Atrac	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
2*. Badland													
3*:													
Badland.													
Rubbleland.													
Rock outcrop.													
4---------- Beje	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
5*:													
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
6*:													
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
Comodore---------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
7*:													
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
Trag----------	C	None---------	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High-----	Moderate.
8---------- Billings	C	None---------	---	>6.0	---	---	>60	---	---	---	High-----	High-----	High.
9*:													
Billings---------	C	None---------	---	>6.0	---	---	>60	---	---	---	High-----	High-----	High.
Gullied land.													

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hard-ness		Uncoated steel	Concrete
				Ft			In		In				
10*, 11*---------- Cabba	D	None---------	---	>6.0	---	---	8-20	Soft	---	---	Moderate	High-----	Moderate.
12*:													
Cabba----------	D	None---------	---	>6.0	---	---	8-20	Soft	---	---	Moderate	High-----	Moderate.
Badland.													
Rock outcrop.													
13*:													
Cabba----------	D	None---------	---	>6.0	---	---	8-20	Soft	---	---	Moderate	High-----	Moderate.
Guben----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Rock outcrop.													
14*, 15*:													
Casmos----------	D	None---------	---	>6.0	---	---	5-20	Hard	---	---	Low------	High-----	Moderate.
Rock outcrop.													
16---------- Chipeta	D	None---------	---	>6.0	---	---	5-20	Soft	---	---	Low------	High-----	High.
17*:													
Chipeta----------	D	None---------	---	>6.0	---	---	5-20	Soft	---	---	Low------	High-----	High.
Badland.													
18*:													
Chipeta----------	D	None---------	---	>6.0	---	---	5-20	Soft	---	---	Low------	High-----	High.
Persayo----------	D	None---------	---	>6.0	---	---	10-20	Soft	---	---	Low------	High-----	Moderate.
19---------- Chupadera	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High-----	Moderate.
20*:													
Comodore---------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
Datino Variant---	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
21, 22---------- Croydon	B	None---------	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
23*:													
Curecanti	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
Pathead	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
Pathead	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
24 Datino Variant	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
25*, 26* Doney	C	None	---	>6.0	---	---	20-40	Soft	---	---	Moderate	High	Moderate.
27*:													
Doney	C	None	---	>6.0	---	---	20-40	Soft	---	---	Moderate	High	Moderate.
Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
28*:													
Doney	C	None	---	>6.0	---	---	20-40	Soft	---	---	Moderate	High	Moderate.
Toze	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
29*. Dumps													
30*:													
Falcon	D	None	---	>6.0	---	---	10-20	Hard	---	---	Low	Moderate	Low.
Rock outcrop.													
31 Ferron	D	None	---	1.0-2.5	Apparent	Jan-Dec	>60	---	---	---	High	High	High.
32*:													
Frandsen	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
Gullied land.													
33*, 34*:													
Gerst	D	None	---	>6.0	---	---	8-20	Soft	---	---	Moderate	High	Moderate.
Badland.													
Rubbleland.													

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
35*:													
Gerst	D	None	---	>6.0	---	---	6-20	Soft	---	---	Moderate	High	Moderate.
Badland.													
Stormitt	B	None	---	>6.0	---	---	>60	---	---	---	Low	High	Moderate.
36*, 37*:													
Gerst	D	None	---	>6.0	---	---	8-20	Soft	---	---	Moderate	High	Moderate.
Strych	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
Badland.													
38*:													
Gerst	D	None	---	>6.0	---	---	6-20	Soft	---	---	Moderate	High	Moderate.
Travessilla	D	None	---	>6.0	---	---	4-20	Hard	---	---	Moderate	High	Moderate.
39* Glenberg	B	Rare	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
40* Glenberg	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
41*:													
Green River	C	Occasional	May-Aug	2.0-3.0	Apparent	Jan-Dec	>60	---	---	---	Moderate	High	High.
Juva Variant	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Low.
42 Greybull	C	None	---	>6.0	---	---	20-40	Soft	---	---	Low	High	High.
43*:													
Grobutte	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
Cabba	D	None	---	>6.0	---	---	10-20	Soft	---	---	Moderate	High	Moderate.
44*, 45*:													
Guben	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
Doney	C	None	---	>6.0	---	---	20-40	Soft	---	---	Moderate	High	Moderate.
Datino Variant	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hard-ness		Uncoated steel	Concrete
				Ft			In		In				
46*:													
Guben----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Pathead----------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High-----	Moderate.
47*:													
Guben----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Rock outcrop.													
48---------- Haverdad	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Low.
49---------- Haverdad	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
50---------- Haverdad	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Low.
51*, 52*, 53*----- Hernandez	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
54*:													
Hernandez---------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Atrac----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
55---------- Hunting	C	None---------	---	2.5-5.0	Apparent	Jan-Dec	>60	---	---	---	High-----	High-----	High.
56---------- Hunting	C	None---------	---	2.0-3.5	Apparent	Jan-Dec	>60	---	---	---	High-----	High-----	High.
57---------- Hunting	C	None---------	---	2.5-5.0	Apparent	Jan-Dec	>60	---	---	---	High-----	High-----	High.
58---------- Juva Variant	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Low.
59, 60---------- Killpack	C	None---------	---	>6.0	---	---	20-40	Soft	---	---	High-----	High-----	High.
61---------- Libbings	D	None---------	---	1.5-2.5	Perched	Jan-Dec	20-40	Soft	---	---	High-----	High-----	High.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hard-ness		Uncoated steel	Concrete
				Ft			In		In				
62*:													
Midfork	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Low.
Comodore	D	None	---	>6.0	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
63*:													
Midfork	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Low.
Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
64 Minchey	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
65, 66, 67 Mivida	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
68 Moffat	B	None	---	>6.0	---	---	>60	---	---	---	Low	High	Moderate.
69*:													
Moffat	B	None	---	>6.0	---	---	>60	---	---	---	Low	High	Moderate.
Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
70*:													
Nelman	C	None	---	>6.0	---	---	20-40	Hard	---	---	Low	High	Moderate.
Travessilla	D	None	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High	Low.
Rock outcrop.													
71 Pathead	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
72*:													
Pathead	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
Curecanti	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
73, 74 Penoyer Variant	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Low.
75* Perma	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
76*:													
Perma	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
Datino	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
77, 78 Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
79*:													
Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
Badland.													
80*:													
Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
Chipeta	D	None	---	>6.0	---	---	5-20	Soft	---	---	Low	High	High.
81*:													
Persayo	D	None	---	>6.0	---	---	10-20	Soft	---	---	Low	High	Moderate.
Greybull	C	None	---	>6.0	---	---	20-40	Soft	---	---	Low	High	High.
82 Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
83*:													
Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
Cabba	D	None	---	>6.0	---	---	10-20	Soft	---	---	Moderate	High	Moderate.
84*:													
Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
Rock outcrop.													
85 Rabbitex	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High	Moderate.
86*:													
Rabbitex	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High	Moderate.
Doney	C	None	---	>6.0	---	---	20-40	Soft	---	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
86*:													
Midfork	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Low.
87*:													
Rabbitex	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High	Moderate.
Pathead	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
88*:													
Rabbitex	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High	Moderate.
Datino Variant	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	High	Moderate.
89 Rafael	D	None	---	0-2.0	Apparent	Jan-Dec	>60	---	---	---	High	High	High.
90, 91 Ravola	B	None	---	>6.0	---	---	>60	---	---	---	High	High	High.
92*:													
Ravola	B	None	---	>6.0	---	---	>60	---	---	---	High	High	High.
Gullied land.													
93*:													
Ravola	B	None	---	>6.0	---	---	>60	---	---	---	High	High	High.
Slickspots.													
94*. Riverwash													
95*. Rock outcrop													
96*:													
Rock outcrop.													
Rubbleland.													
Travessilla	D	None	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High	Low.
97*:													
Rottulee	C	None	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High	Moderate.
Trag	C	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
98---------- Sagers	B	None---------	---	>6.0	---	---	>60	---	---	---	Low------	High-----	Moderate.
99---------- Saltair	D	None---------	---	3.5-5.0	Apparent	Mar-Oct	>60	---	---	---	High-----	High-----	High.
100, 101---------- Senchert	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
102*:													
Senchert----------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
Senchert family--	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
103*:													
Senchert----------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
Toze----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
104*---------- Senchert	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
105*:													
Senchert family--	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
Senchert----------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
106*:													
Sheepcan----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Podo----------	D	None---------	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
Rock outcrop.													
107*:													
Shupert----------	C	Rare---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Winetti----------	B	Rare---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
108---------- Silas	C	None---------	---	1.5-3.5	Apparent	May-Jul	>60	---	---	---	High-----	Moderate	Low.
109*:													
Silas----------	C	None---------	---	1.5-3.5	Apparent	May-Jul	>60	---	---	---	High-----	Moderate	Low.
Brycan----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hard-ness		Uncoated steel	Concrete
				Ft			In		In				
110---------- Stormitt	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
111*:													
Stormitt---------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
Minchey----------	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
112, 113, 114----- Strych	B	None---------	---	>6.0	---	---	>60	---	---	---	Moderate	High-----	Moderate.
115---------- Trag	C	None---------	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High-----	Moderate.
116*:													
Trag----------	C	None---------	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High-----	Moderate.
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
Rottulee---------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	High-----	Moderate.
117*:													
Trag----------	C	None---------	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High-----	Moderate.
Beje----------	D	None---------	---	>6.0	---	---	10-20	Hard	---	---	Moderate	High-----	Moderate.
Senchert---------	C	None---------	---	>6.0	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
118*:													
Trag----------	C	None---------	---	>6.0	---	---	40-60	Hard	---	---	Moderate	High-----	Moderate.
Croydon----------	B	None---------	---	>6.0	---	---	40-60	Soft	---	---	Moderate	Moderate	Moderate.
119---------- Travessilla	D	None---------	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High-----	Low.
120*:													
Travessilla------	D	None---------	---	>6.0	---	---	4-20	Hard	---	---	Moderate	High-----	Moderate.
Rock outcrop.													
121*:													
Travessilla------	D	None---------	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High-----	Low.
Rock outcrop.													

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding		High water table			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Months	Depth	Kind	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
				Ft			In		In				
121*:													
Gerst	D	None	---	>6.0	---	---	6-20	Soft	---	---	Moderate	High	Moderate.
122*:													
Travessilla	D	None	---	>6.0	---	---	4-20	Hard	---	---	Moderate	High	Moderate.
Travessilla family	D	None	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High	Moderate.
Rock outcrop.													
123* Travessilla	D	None	---	>6.0	---	---	7-20	Hard	---	---	Moderate	High	Moderate.
124*:													
Uinta	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Moderate	Low.
Podo	D	None	---	>6.0	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
125*:													
Uinta	B	None	---	>6.0	---	---	40-60	Hard	---	---	Moderate	Moderate	Low.
Toze	B	None	---	>6.0	---	---	>60	---	---	---	Moderate	Moderate	Low.
126 Winetti Variant	B	Rare	---	>6.0	---	---	>60	---	---	---	Low	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Atrac	Fine-loamy, mixed, mesic Ustollic Camborthids
Beje	Loamy, mixed Lithic Argiborolls
Billings	Fine-silty, mixed (calcareous), mesic Typic Torrifluvents
Brycan	Fine-loamy, mixed Cumulic Haploborolls
Cabba family	Loamy, mixed (calcareous), frigid, shallow Typic Ustorthents
Casmos	Loamy, mixed (calcareous), mesic Lithic Torriorthents
Chipeta	Clayey, mixed (calcareous), mesic, shallow Typic Torriorthents
Chupadera	Coarse-loamy, mixed, mesic Ustollic Calciorthids
Comodore	Loamy-skeletal, mixed Lithic Haploborolls
Croydon	Fine-loamy, mixed Argic Cryoborolls
Curecanti family	Loamy-skeletal, mixed Typic Argiborolls
Datino	Loamy-skeletal, mixed Typic Haploborolls
Datino Variant	Loamy-skeletal, mixed Typic Haploborolls
Doney family	Fine-loamy, mixed, frigid Typic Ustochrepts
Falcon	Loamy, mixed Lithic Haploborolls
Ferron	Coarse-silty, mixed (calcareous), mesic Typic Fluvaquents
Frandsen	Fine-loamy, mixed (calcareous), frigid Typic Ustorthents
Gerst	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Glenberg family	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Green River	Coarse-loamy, mixed (calcareous), mesic Aquic Ustifluvents
Greybull	Fine-loamy, mixed (calcareous), mesic Typic Torriorthents
Grobutte family	Loamy-skeletal, mixed (calcareous), frigid Ustic Torriorthents
Guben	Loamy-skeletal, mixed Typic Calciborolls
Haverdad	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Hernandez family	Fine-loamy, mixed, mesic Ustollic Calciorthids
Hunting	Fine-silty, mixed (calcareous), mesic Aquic Ustifluvents
Juva Variant	Coarse-loamy, mixed (calcareous), mesic Typic Torrifluvents
Killpack	Fine-silty, mixed (calcareous), mesic Typic Torriorthents
Libbings	Fine, mixed, mesic Typic Salorthids
Midfork family	Loamy-skeletal, mixed Typic Cryoborolls
Minchey	Fine-loamy, mixed, mesic Typic Calciorthids
Mivida	Coarse-loamy, mixed, mesic Ustollic Calciorthids
Moffat	Coarse-loamy, mixed, mesic Typic Calciorthids
Nelman	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents
Pathead	Loamy-skeletal, mixed (calcareous), frigid Typic Ustorthents
Penoyer Variant	Coarse-silty, mixed (calcareous), mesic Typic Torriorthents
Perma family	Loamy-skeletal, mixed Typic Haploborolls
Persayo	Loamy, mixed (calcareous), mesic, shallow Typic Torriorthents
Podo	Loamy, mixed (calcareous), frigid Lithic Ustorthents
Rabbitex	Fine-loamy, mixed Typic Calciborolls
Rabbitex family	Fine-loamy, mixed Typic Calciborolls
Rafael	Fine-silty, mixed (calcareous), mesic Typic Haplaquepts
Ravola	Fine-silty, mixed (calcareous), mesic Typic Torrifluvents
Rottulee family	Fine-loamy, mixed Typic Haploborolls
Sagers	Fine-silty, mixed (calcareous), mesic Typic Torriorthents
Saltair	Fine-silty, mixed, mesic Typic Salorthids
Senchert	Fine-loamy, mixed Argic Pachic Cryoborolls
Senchert family	Fine-loamy, mixed Argic Pachic Cryoborolls
Sheepcan	Fine-loamy, mixed (calcareous), frigid Typic Ustorthents
Shupert	Fine-loamy, mixed (calcareous), frigid Typic Ustifluvents
Silas	Fine-loamy, mixed Cumulic Cryoborolls
Stormitt	Loamy-skeletal, carbonatic, mesic Ustollic Calciorthids
Strych	Loamy-skeletal, mixed, mesic Ustollic Calciorthids
Toze family	Fine-loamy, mixed Calcic Pachic Cryoborolls
Trag	Fine-loamy, mixed Typic Argiborolls
Travessilla	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Travessilla family	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Uinta family	Fine-loamy, mixed Typic Cryoboralfs
Winetti	Loamy-skeletal, mixed (calcareous), frigid Typic Ustifluvents
Winetti Variant	Sandy-skeletal, mixed (calcareous), mesic Ustic Torriorthents

* U.S. GOVERNMENT PRINTING OFFICE : 1988 O - 183-510 : QL 3

Winter Quarters Canyon
Data Adequacy

October 1992

SKYLINE MINES
MINING AND RECLAMATION PLAN
VOLUME 1, 1992

SKYLINE MINES

MINING AND RECLAMATION PLAN

COASTAL STATES ENERGY COMPAN

1992

VOLUME 1

2.11 SOILS

At each vegetation reference site a soil pit was excavated to the parent material layer. The exposed soil profile allowed for determination of information for classification of the soils into taxonomic units. The portal-yard and bypass access road areas were also sampled. Soils collected at the portal-yard sites were taken as a composite of the top six inches of the profile.

In addition to depth information obtained from the soil pit descriptions, there were 100 depth measurements along the transect areas and in the validation sites. Those readings were obtained by observing the depth of penetration of a sharpened steel rod.

Soils were classified to family unit according to the system utilized for classification of soils by the Soil Conservation Service (Johnson, 1975). Use of this method will allow correlation of permit area soils at the series level when the Soil Conservation Service completes the mapping effort of adjacent areas.

The data compiled on soils suggest that a cryic temperature regime is a proper designation for this area. Cryic is typically conifer-aspen related, with some high meadows included. These areas are too cold for cultivation of crop plants by ordinary means. Frigid designation is given to soils typical of aspen-sagebrush types, and some crops can be grown. Most of the soils are in the udic (moisture arriving in summer) regime.

Maps of soil/plant associations including cadastral locations are presented in the Vegetation and Soils Report submitted in the original application and are in Volume A-2. All soils have textures ranging from sandy loams to clay loams, and are considered neither unusual for the area in general nor for the vegetation types those soils support. The soils are not of a textural class that would be considered a problem either in

disturbance or in reclamation activities. A comparison of spruce-fir and aspen soils, which as broad categories make up more than 80 percent of the permit area soils, shows that the pH and salinity measurements are probably normal for this climatic regime with the pH range from somewhat acidic to neutral for spruce-fir and aspen soils. There is a slight difference in soil reaction between spruce-fir (pH 5.0) and aspen (pH 6.0) soils, but this is also considered to be characteristic (i.e., evergreen conifer types more acidic than the deciduous forest of aspen.)

Saline soil measured in the permit area, at reference site 2 - (Plate 2.7.1-1), aspen with an EC x 10^3 value of 1.88, is considered extremely low when compared to agricultural soils. A slight difference between soils is noted when depths are compared. The solum of aspen extends to an average depth of 20 inches from nine locations and to 18 inches at seven locations of the spruce-fir. This corresponds to the average depths of penetrometer readings in aspen of 19.9 inches and of 18.1 inches in spruce-fir soils.

It is also apparent that soils in aspen communities are more fertile in the commonly applied fertilizers, N, P, and K, and also in most micro-nutrients. The levels of Fe, Mg, and Mn are considered to be adequate for growth of native vegetation, even though somewhat below amounts reported for average soils in the western United States (Shacklette, et. al., 1971). Moderate amount of Zn, Ca, and K indicate that adequate quantities of these minerals are present, except in sagebrush soils.

High amounts of Ca, especially in the B-horizon of spruce-fir soils, are not considered a problem in immobilization of P due to the acid pH for these soils. Concentrations of Ca in sagebrush and aspen soils could become a problem in P relations if soils are altered to become more basic. NO_3-nitrogen is low in quantity, as was expected for these soil types. Average amounts of NO_3-nitrogen are inadequate in all soils of the region and all horizons. All areas would respond to addition of nitrogen, as

indicated by the low total nitrogen content from all vegetation types.

In summary, the most important fertilizer to be applied in reclamation attempts is nitrogen. The addition of nitrogen should be timed with suitable moisture content in the soils (fall and spring). A soils map of the portal-yard area has been prepared and is available at the Skyline Mine office. The soils are classified by the vegetation type with which they are correlated, as recommended by the Soil Conservation Service. Information from other areas to be disturbed can be extrapolated from the vegetative map and from the soil nomenclature assigned on the portal-yard area map.

Available topsoil for revegetation is identified on Table 2.11-2. Topsoil will be redistributed (See Table 2.11-1) with 12" of topsoil on the waste rock site. North slopes, and south slopes with up to 30", will be topsoiled on areas where tree and shrub transplants (see Table 4.7-4) will be concentrated (clumped) to benefit wildlife on the south slopes.

Only soil from the "A and B" horizons were collected and put into the topsoil stockpile and considered as "useable" for reclamation purposes. The soil from the "C" horizon was considered unsuitable and therefore not removed and not put into the topsoil stockpile.

TABLE 2.11-1

Seeded Vegetation	Acres	Planned Depth/in.	Yards^3
South Slope Seed Mixture	20.70	12	28,556
North Slope Seed Mixture	19.92	12	24,683
South Slope Transplant Area	17.00	30	60,500
Waste Rock Seed Area	1.67	12	2,097
TOTAL	59.29*		115,836

* Includes all disturbed areas for entire permit area.

TABLE 2.11-2
TOPSOIL VOLUMES

Area	Mapping Unit	Vegetation	Acreage	Good (Ave Depth/ft)	Poor (Ave Depth/ft)	Useable Soil, yd^3	Unsuitable Soil, yd^3
Load Out	1	Sagebrush/ Grass/forb	7.62	2.5	2.5	27,023	27,023
	2	Grass/forb	4.0	4.5	0.5	3,630	403
	3	Spruce/fir	1.4	1.7	3.3	3,291	6,388
	4	Sagebrush/ Grass/Snowberry	0.8	1.7	3.3	1,645	3,194
TOTAL			13.82			35,589	37,008
Portal Yard	2	Grass/forb	1.3	4.5	0.5	9,438	1,048
	5	Sagebrush/ Grass	2.5	0.5	0.5	2,016	2,016
	6	Aspen/ Snowberry	1.5	2.5	2.5	2,017	2,017
	11	Aspen	6.31	2.5	1.5	21,376	12,826
	12	Grass/forb Elderberry	6.0	2.5	--	20,166	--
	13	Spruce/fir	16.0	1.0	2.5	22,587	56,467
	14	Grass/forb	2.5	0.6	1.5	2,420	6,050
TOTAL			36.11			80,020	80,424

TABLE 2.11-2 (continued)
TOPSOIL VOLUMES

Area	Mapping Unit	Vegetation	Acreage	Good (Ave Depth/ft)	Poor (Ave Depth/ft)	Useable Soil, yd^3	Unsuitable Soil, yd^3
Conveyor Route	2	Grass/Forb	0.8	4.5	0.5	5,808	645
	5	Sagebrush/ Grass	2.1	0.5	0.-	1,694	--
	6	Aspen/ Snowberry	0.1	2.5	2.5	403	403
	7	Sagebrush/ Grass	0.3	--	--	--	--
	8	Aspen	.3	2.0	3.0	968	1,452
	9	Rock Outcrops	0.3	--	--	--	--
	10	Aspen	0.5	2.5	1.0	2,017	807
	11	Aspen	0.8	2.5	1.5	3,227	1,936
	12	Grass/forb Elderberry	0.3	2.5	--	1,210	--
	13	Spruce/fir	0.5	1.0	2.5	806	2,016
Total - Conveyor			6.0			16,133	7,259
Waste Rock Disposal		Sagebrush/ Grass	1.67	0	0	0	0
Water Tank & Wells		Aspen	.26				
South Fork Breakout		Aspen	.3	4.5	4.4	2,242	2,133
		Spruce/Fir	.66	4.5	4.4	747	74
GRAND TOTAL			58.82			134,731	127,535

Additional Study

In coordination with Soil Conservation Service (SCS) personnel, the Permittee designed and performed a soil survey at the reconnaissance level for the permit area and a high-intensity detailed soil survey for the surface disturbance areas. Nondisturbed areas were surveyed at an Order 3 level. Survey results are located in Appendix Volume A-2 and in Volume 5, Section 19 for the South Fork breakout area.

Survey standards were based on those described in the National Soil Survey Handbook and the Revised Soil Survey Manual which are standards for the National Cooperative Soil Survey Standards.

Survey maps are of a scale greater than 1:12,000 for all areas. As the survey progressed mapping unit descriptions including potential productivity of existing soils were developed in compliance with the above standards and submitted with all survey results.

The soils and other strata of the portal area were sampled, mapped, and studied in detail.

Endangered Plant Studies, Inc. (EPS) and Dames & Moore (D&M) have reported results of studies performed in the Skyline permit area, including detailed study of the portal area. EPS excavated soil pits in the portal area and other parts of the permit area. Soils were described, classified, sampled and analyzed as outlined in the Vegetation and Soils Report. In addition, D&M sampled soils at frequent intervals and obtained continuous cores of bedrock at 26 locations in Eccles Canyon, including the portal area. These borehole descriptions are presented in Section 2.2, Geology and Geotechnical, of this plan. The EPS and D&M reports are in Appendix Volumes A-2 and A-3.

In order to characterize overburden in the portal area, it is necessary to relate the D&M study to the geologic characteristics

present in the Skyline permit area (Described in Section 2.2, Geology Report). Soil types and distributions were mapped by EPS (Map 2.11-1) and the numerous soil descriptions and analyses can be readily extrapolated using the EPS report. Consolidated rock strata of the Blackhawk Formation are more difficult to map, however, and make the extrapolation of core data more difficult.

In this Application, the Aberdeen Sandstone and the overlying upper coal-bearing unit of the Blackhawk Formation are described. In the portal area, the Aberdeen Sandstone lies from 0 to 4 feet below the lowest coal seam to be mined and is continuous and of uniform lithology. Therefore, the Aberdeen description as presented suffices to characterize the lowest unit of interest throughout the portal area, even though it is poorly exposed. In contrast to the Aberdeen, the overlying sedimentary rocks are variable in extent and lithology. Because of the highly variable nature of these poorly exposed rocks, detailed mapping of individual lithologic units in the subsurface is not feasible. However, certain generalizations can be made regarding the relative percentages of the rock types present. Recent interpretative geologic work has focused on modelling ancient depositional environments for the sedimentary rocks in the coal-bearing sequence immediately overlying the Aberdeen Sandstone. Based on concepts developed it is possible to make general statements about the frequency of occurrence of various rock types in any area of the property. These predictions based on depositional models are believed to be more reliable than simple extrapolation between boreholes.

Stratigraphic studies in the permit area are based primarily on subsurface geophysical logs. These logs are available at the Skyline Mine office. The sources used to interpret lithology include the natural gamma, the gamma-gamma (density), the single-point resistivity, and sometimes the spontaneous potential and caliper logs. Studies of the relative percentages of sandstone, siltstone, claystone, and coal in each borehole suggest that ancient stream channels present in a specified

stratigraphic interval had preferred orientations, and tend to be stacked in echelon or otherwise concentrated along trends of high sandstone percentage.

Using these results, relative proportions of the several lithologies can be extrapolated to the portal area, even through individual channels may not be correlated between boreholes In the 200 feet of strata immediately overlying the Aberdeen Sandstone, paleochannels have a preferred east-west orientation in the portal area. Based on extrapolation along this trend, percentages of lithotypes have been estimated for the portal area. For the described 200-foot stratigraphic interval, and excluding coal seams, the major lithologies are: sandstone 40%, siltstone 30%, and claystone 30%.

These lithologies have been described in detail in Section 2.2 (Geology) and in Volume A-3. The percentages may vary considerably from percentages in many boreholes drilled by D&M in the portal area. However, on the average these percentages are more representative of the character of the non-coal strata than estimated for individual boreholes.

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Shacklette et al. 1971 Elemental composition of surficial materials in the conterminus United States. US Geol. Survey Professional paper 547-C.

2.14 PRIME FARMLAND INVESTIGATION

A pre-application investigation was conducted by the Permittee to determine if any prime farmland would be impacted within the area of the proposed surface facilities. Based on the criteria in 30 CFR 783.27 paragraph (b), items 1 and 5, the Eccles Canyon area cannot be classified as prime farmland. This opinion is substantiated by Dr. Therom B. Hutchings, State Soil Scientist for the Soil Conservation Service (See Exhibit A). Therefore, a negative determination for prime farmland classification of the Skyline project area is requested.

EXHIBIT A

United States Department of Agriculture
Soil Conservation Service
4012 Federal Building
125 South State Street
Salt Lake City, UT 84138

August 29, 1979

Keith W. Welch
Environmental Coordinator
Coastal States Energy Company
1354 East 3300 South, Suite 303
Salt Lake City, UT 84106

Dear Mr. Welch:

Field evaluation of the area outlined on your map in Eccles Canyon shows no prime farmland in that area.

Criteria for determination of prime rangeland have not been developed and agreed upon between agencies. We can not, therefore, evaluate prime rangeland.

I am returning your map.

Sincerely,

T. B. HUTCHINGS
State Soil Scientist

Enclosure

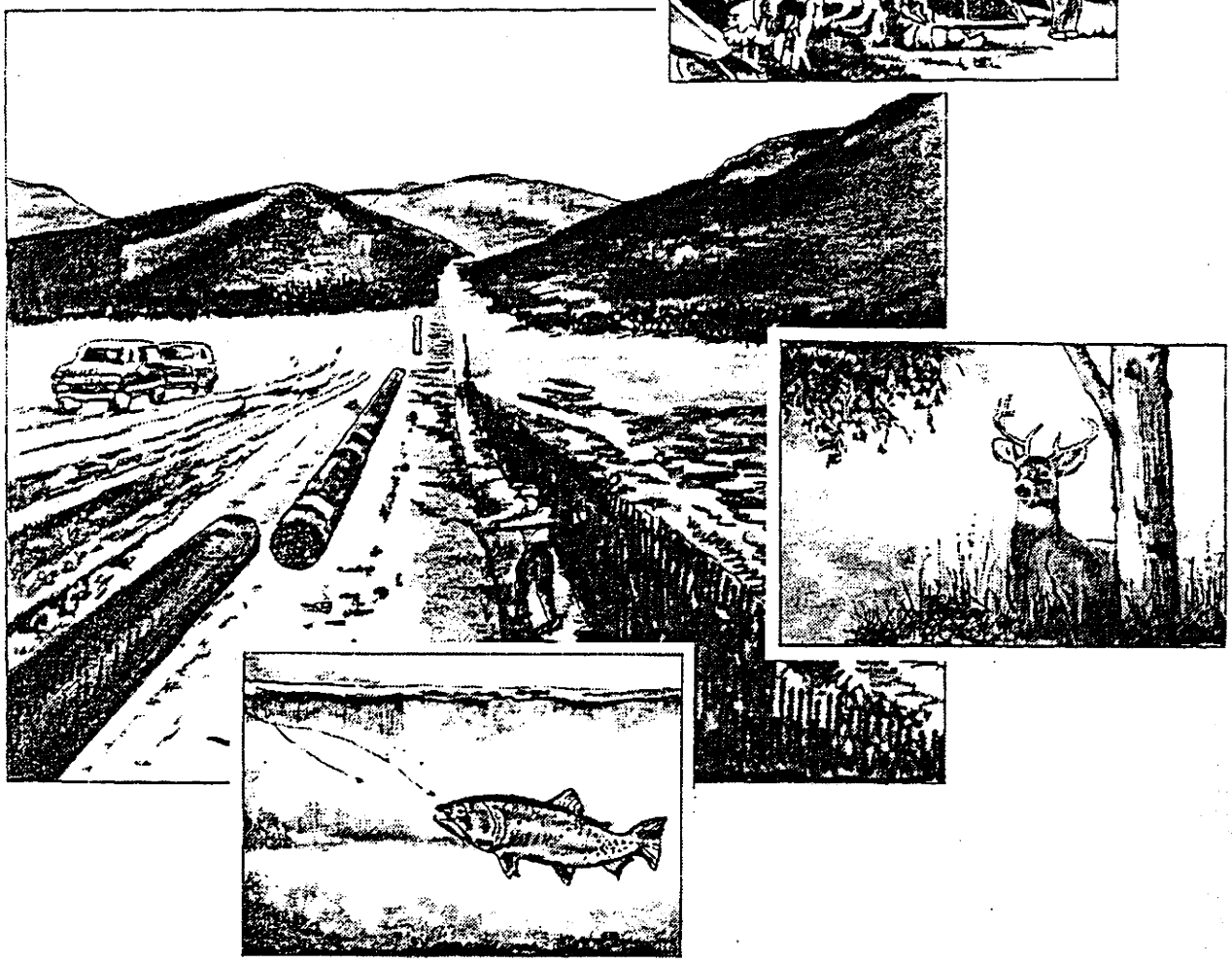
cc:
Ed Burton, AC, Orem
Gary Moreau, DC, Price

Winter Quarters Canyon
Data Adequacy

October 1992

QUESTAR PIPELINE COMPANY'S
MAIN LINE No. 41
FINAL ENVIRONMENTAL IMPACT STATEMENT

Questar Pipeline Company's



Main Line No. 41
Reroute at Skyline Mine

Final Environmental Impact Statement

US Department of Agriculture
Forest Service, Manti-La Sal National Forest

JULY 1990
Dames & Moore

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B - Descriptions of Proposed Route Locations
C - Study Area Map
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Soils

The sensitivity of the soils to erosion by water was assessed. Generally, soil erosion hazard was determined by slope steepness, soil types, cover, precipitation, and snow-melt patterns. Proposed construction methods were considered in the assessment of impacts to soils.

Considering the mitigation measures that would be used to control erosion and the ability of the soils to revegetate the surface, the long-term impacts to the soils are considered to be low, except in areas of unstable slopes or seeps. There would be a greater potential for long-term soil erosion on unstable slopes and seep areas.

The majority of impacts resulting from construction activities would be short term and low. Caution during construction and effective reclamation techniques would diminish the impacts. Generally, very little increase in soil erosion would be anticipated to occur as a result of pipeline construction. Much of the existing and proposed routes would be

located along relatively flat valley bottoms and ridgetops. However, some specific areas along the proposed routes are sensitive to erosion and are discussed below.

Short-term moderate impacts could occur along the slopes adjacent to Gooseberry Creek along Segment 12*, on the valley bottoms of Upper Huntington and Burnout Canyons along Segments 16, 2, 3a, and 3b, on the ridge east of Upper Huntington Canyon along Segment 18*, and on the ridge east of Burnout Canyon along Segments 9 and 10*. Moderate, short-term impacts also could occur on the ridge east of Mud Creek along Segments 20 and 22, along the ridge north of Broads Canyon and along the valley bottom along Mud Creek on Segment 21, and on the slopes east and west of Mud Creek along Segments 19* and 23*. Potentially low, short-term impacts could occur in the remainder of the area impacted by pipeline construction.

Impacts to soils in riparian areas could occur in dry meadow areas (meadow soils that are wet only part of the year) and wet meadow areas (meadow soils that are wet year round). Dry meadow areas typically exhibit flat land surface and soils of low susceptibility to compaction. Potential impacts in these areas would be low. Wet meadow areas typically have soils susceptible to compaction and with potential for erosion hazard. Potential impacts in these areas would be moderate. Impacts to soils at stream crossings would be moderate because of the potential for erosion of the stream banks and compaction of the soils. With implementation of mitigation measures, these areas would recover successfully. Therefore, impacts to these areas resulting from construction activities would be short term.

The following descriptions summarize the criteria used to determine levels of impacts.

High Impacts

- a substantial adverse change or stress to the soil
- loss of soil productivity to the extent that vegetation would be difficult to reestablish and grow

Moderate Impacts

- a potential small change or stress to the soil
- loss of soil productivity to the extent that vegetation is able to grow, but not to previous ability

Low Impacts

- soils in areas of low erosional potential
- loss of small amount of soil productivity

No Identifiable Impacts

- soils with slight erosional hazard
- no measurable loss of soil productivity

Specific Descriptions

Table 4-4 summarizes the potential long-term impacts to soils along each alternative. Both long-term and short-term (where applicable) impacts to soils are described below.

Alternative A - No-Action - Approximately 0.7 mile of moderate long-term impact currently exists along Segment 12* on unstable slopes adjacent to Gooseberry Creek and east of the Gooseberry graben. The remainder of the route has 12.8 miles of low long-term impact. No impact to soils from construction disturbance would occur.

Alternative B - Leave in Place, Full Extraction Mining - Along the entire route, approximately 0.7 mile of moderate long-term impact currently exists along Segment 12* as described above. A low level of short-term impact would occur from construction of the 4.25-mile-long redundant pipeline. Installation of strain gauges on the existing pipeline would require excavation about every 100 feet along the pipeline. Later, excavation would be required to repair the existing buried pipeline. With proper revegetation to reduce the potential of erosion resulting from the excavations, impacts would be low.

Alternative C - Burnout Canyon Route (1) - Along the entire route, approximately 0.7 mile of moderate long-term impacts currently exist along Segment 12* as described in Alternative A. Originally, Segment 3b crossed approximately 0.2 mile of unstable land conditions along the lower part of the north slope of Burnout Canyon. To reduce the potential for slope failure, the alignment of Segment 3b would be moved downslope. Although the alignment is moved, low long-term impacts could still occur along the 0.2 mile of this area from construction within the toe of the slope. Low long-term impacts would occur to all 5.7 miles impacted by construction activities. Approximately 3.3 miles of moderate short-term impacts could occur from construction resulting in erosion and compaction of the soils along the riparian areas of Upper Huntington Canyon and Burnout Canyon. If this route is selected, the abandoned portion of the existing right-of-way would be reclaimed and improved.

Alternative C - Burnout Canyon Route (2) - The impacts would be the same as Burnout Canyon Route (1) except 5.2 miles of low long-term impact could occur from pipeline construction. If this route is selected, the abandoned portion of the existing right-of-way would be reclaimed and improved.

Alternative C - Burnout Canyon Route (3) - Segment 24 would cross the bottom of an unstable slope that could result in moderate long-term impacts to soils. However, through stipulations by the Forest Service, the long-term impacts would be reduced to low. Impacts would be the same as Burnout Canyon Route (1), except 5.9 miles of low long-term impact could occur from pipeline construction.

Alternative C - Burnout Canyon Route (4) - Mitigation measures would be employed to reduce impacts from unstable slopes along Segments 3b and 24. The impacts along this

route would be the same as Burnout Canyon Route (2), except 5.4 miles of low long-term impact could occur from pipeline construction.

Alternative D - Gooseberry Route - Moderate, potentially long-term impacts from pipeline construction activities could occur along 0.6 mile of unstable slopes east of Gooseberry graben and along seep areas east of Skyline Drive. The remaining 12.0 miles of the affected portion of the route would receive low long-term impacts. Short-term moderate impacts would occur along 1.4 miles of riparian area in Upper Huntington Canyon and Burnout Canyon. If this route is selected, the unstable areas (0.7 mile) along Segment 12* would be reclaimed providing an opportunity to improve the areas and lower the moderate level of impact. Also, if this route is selected, the abandoned portion of the existing right-of-way would be reclaimed and improved.

Valley Camp Connector (1) - Along the entire connector, approximately 1 mile of low long-term impacts could occur, of which 0.6 mile would be from construction of pipeline.

Valley Camp Connector (2) - Approximately 0.4 mile of moderate long-term impact could occur from pipeline construction in areas of seeps and springs along Segment 8 at the head of Burnout Canyon. The remainder of the connector would have low impacts.

Valley Camp Connector (3) - Low, long-term impacts could occur along the entire 0.5 mile of the connector. Approximately 0.1 mile of moderate short-term impacts could occur to soils with a high hazard of erosion along the east end of Segment 9 at the head of Boardinghouse Canyon.

Alternative E - Winter Quarters Route (1) - Along the entire route, approximately 0.7 mile of moderate long-term impact currently exists along Segment 12* as described in Alternative A. Low long-term impacts would occur along the entire 12.4 miles proposed for pipeline construction. Approximately 5.9 miles of short-term moderate impacts would occur from highly erodible soils on steep slopes and along 0.3 mile of wetland soils near Scofield. The remaining area would have low short-term impacts. If this route is selected, the abandoned portion of the existing alignment would be reclaimed and improved. No new impacts would occur along associated Segments 19* and 23*.

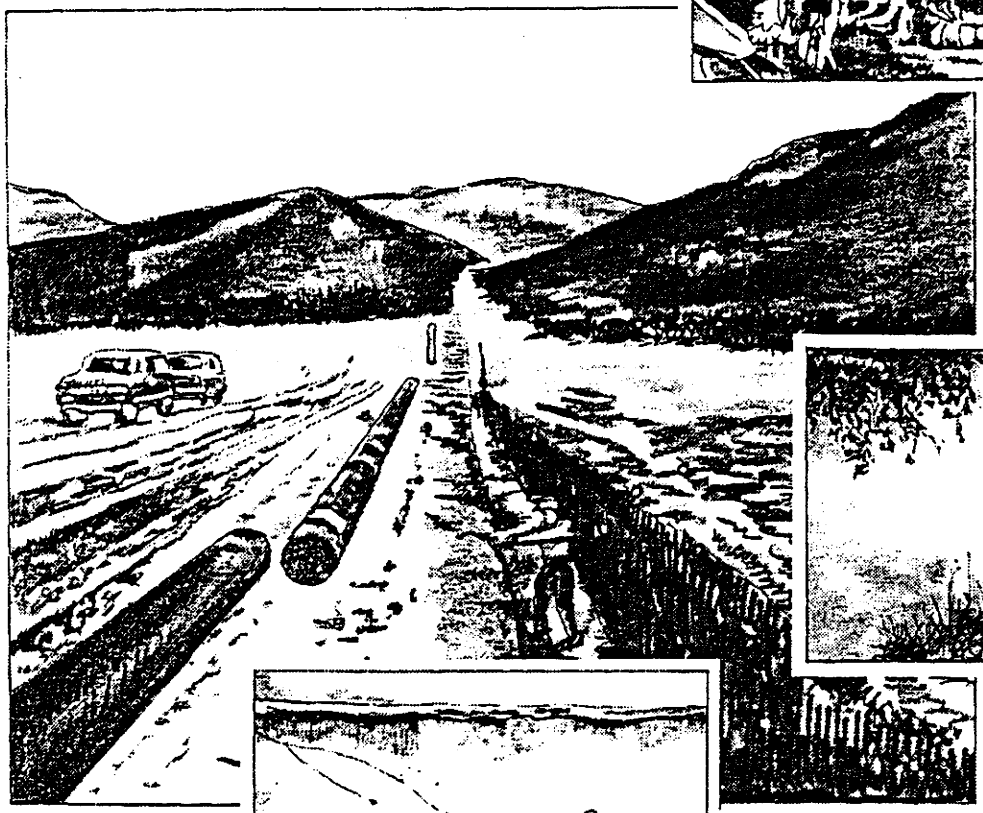
Alternative E - Winter Quarters Route (2) - Same as Winter Quarters Route (1), except 5.7 miles of moderate short-term impacts would occur to highly erodible soils on steep slopes.

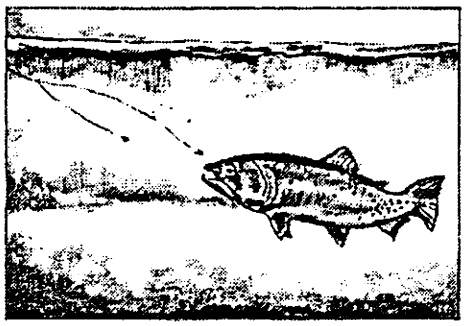
TABLE 4-4
SUMMARY OF POTENTIAL IMPACTS: SOILS
(Miles of entire route/Miles of new pipeline)

Route	Total Miles	High	Moderate	Low	No Identifiable	Comments
Alternative A						
No-Action	13.5/NA	0.0/NA	0.7/NA	12.8/NA	0.0/NA	land instability along Segment 12*
Alternative B						
Leave in Place, Full Extraction Mining	13.5/4.25	0.0/0.0	0.7/0.0	12.8/4.25	0.0/0.0	land instability along Segment 12*
Alternative C						
Burnout Canyon (1)	14.9/5.7	0.0/0.0	0.7/0.0	14.2/5.7	0.0/0.0	land instability along Segments 12* and 3b.
Burnout Canyon (2)	15.1/5.2	0.0/0.0	0.7/0.0	14.4/5.2	0.0/0.0	land instability along Segments 12* and 3b.
Burnout Canyon (3)	15.1/5.9	0.0/0.0	0.7/0.0	14.4/5.9	0.0/0.0	land instability along Segments 12* 24, and 3b.
Burnout Canyon (4)	15.3/5.4	0.0/0.0	0.7/0.0	14.6/5.4	0.0/0.0	land instability along Segments 12* 24, and 3b.
Alternative D						
Gooseberry Route	16.7/12.6	0.0/0.0	0.6/0.6	16.1/12.0	0.0/0.0	land instability and seep areas along Segment 1
Valley Camp Triangle Connectors						
(1)	1.0 /0.6	0.0/0.0	0.0/0.0	1.0 /0.6	0.0/0.0	no land instability identified
(2)	0.9 /0.6	0.0/0.0	0.4/0.4	0.5 /0.2	0.0/0.0	seeps, springs along Segment 8
(3)	0.5 /0.5	0.0/0.0	0.0/0.0	0.5 /0.5	0.0/0.0	no land instability identified
Alternative E						
Winter Quarters (1)	16.1/12.4	0.0/0.0	0.7/0.0	15.4/12.4	0.0/0.0	land instability along Segment 12*
(with Segments 19* and 23*)	20.2/12.4	0.0/0.0	0.7/0.0	19.5/12.4	0.0/0.0	land instability along Segment 12*
Winter Quarters (2)	17.2/12.2	0.0/0.0	0.7/0.0	16.5/12.2	0.0/0.0	land instability along Segment 12*
(with Segment 19*)	20.0/12.2	0.0/0.0	0.7/0.0	19.3/12.2	0.0/0.0	land instability along Segment 12*

Note: Table reflects long-term impacts only.

Questar Pipeline Company's





Main Line No. 41 Reroute at Skyline Mine

Final Environmental Impact Statement

US Department of Agriculture
Forest Service, Manti-La Sal National Forest

JULY 1990
Dames & Moore

Soils

The issues pertaining to soils are soil erosion and compaction from pipeline construction and maintenance. Erosion occurs from the bare soil surface after the soil has been placed over the buried pipeline. Compaction occurs from movement of heavy equipment across the soil surface.

Background

The soils in the study area are on mountain ridges and steep sideslopes, and in valleys with flat bottoms or rolling hills at an elevation range of 7,000 to 10,000 feet. On the mountain ridges and side slopes, the soils are generally deep or moderately deep, well-drained silt loams, clay loams, and loams. Rock fragments, gravel, stones, or boulders occur on the surface of much of the mountain soils, while dense litter covers the soil in forested areas. Rock outcrops occur occasionally on the sideslopes. The hazard of water erosion is high on most of the steep side slopes if vegetation is removed, and is moderate to low on the mountain ridges and valley bottoms.

The soils on the rolling hills and flat valley bottoms are generally shallow to very deep consisting of clay loams, or loams with gravel and cobbly rock occurring near canyon side slopes. The hazard of water erosion for these soils are generally moderate to low.

No prime farmland occurs in the study area.

The soils in the riparian areas are generally deep, fine loams overlying sands or sands containing gravels, cobbles, and some boulders. Wetland soils are present immediately adjacent to the streams and in about half the area of the flat-bottomed valley at the mouth of Winter Quarters Canyon and Mud Creek near Scofield. These wetland soils have a high potential for compaction and low soil stability during trenching activities. Most of the corridor right-of-way along Mud Creek north of Clear Creek and along Upper Huntington Creek is on the dry meadow areas outside the wet soil areas near the stream.

The inventory for the soils was obtained from soil descriptions prepared by the Forest Service and from the Soil Survey of the Carbon Area prepared by the Soil Conservation Service (SCS). The study area contains 36 soil map units of which 19 could be crossed by the alternative routes. Table 3-3 summarizes stream crossings, riparian areas crossed, erosion potential, and land instability by alternative.

Specific Descriptions

Alternatives A and B - The route crosses 4.4 miles of potential high erodible soils located along Segment 12* near Gooseberry Creek, along Segments 10* and 19* near the Valley Camp Triangle, and along the eastern part of Segments 19* and 23*. The remaining 8.8 miles of the route contain soils with a moderate potential for erosion, except along 0.3 mile at the western end of Segment 12* which has a low soil erosion potential. Approximately 0.7 mile of unstable land is located near Gooseberry Creek.

Alternative C - Burnout Canyon Route (1) - The entire route would cross 5.4 miles of potentially high erodible soils, of which only 3 miles would be crossed by new pipeline. Approximately 9.2 miles (2.7 miles would be crossed by new construction) of moderate

TABLE 3-3
SUMMARY OF SOIL AND WATER RESOURCES
(Miles of entire route/Miles of new pipeline)

Route	Total Miles	Number of Perennial Stream Crossings	Miles Within 500 feet of a Perennial Stream	Potential Hazard of Erosion			Known Land Instability and Seep Areas
				High	Moderate	Low	
Alternative A							
No-Action	13.5/NA	2 / NA	0.4/NA	4.4/NA	8.8/NA	0.3/NA	0.7/NA
Alternative B							
Leave in Place, Full Extraction Mining	13.5/4.25	2 / 0	0.4/0.0	4.4/0.4	8.8/3.85	0.3/0.0	0.7/0.0
Alternative C							
Burnout Canyon (1)	14.9/5.7	12 / 10	3.7/3.3	5.4/3.0	9.2/2.7	0.3/0.0	0.9/0.2
Burnout Canyon (2)	15.1/5.2	12 / 10	3.7/3.3	5.4/3.0	9.4/2.2	0.3/0.0	0.9/0.2
Burnout Canyon (3)	15.1/5.9	5 / 3	3.9/3.5	5.6/3.2	9.2/2.7	0.3/0.0	2.6/1.9
Burnout Canyon (4)	15.3/5.4	5 / 3	3.9/3.5	5.6/3.2	9.4/2.2	0.3/0.0	2.6/1.9
Alternative D							
Gooseberry Route	16.7/12.6	7 / 6	2.0/1.8	4.9/1.4	7.3/6.7	4.5/4.5	0.8/0.8
Valley Camp Triangle Connectors							
(1)	1.0/0.6	0 / 0	0.0/0.0	0.1/0.0	0.9/0.6	0.0/0.0	0.4/0.4
(2)	0.9/0.6	0 / 0	0.0/0.0	0.1/0.0	0.8/0.6	0.0/0.0	0.4/0.4
(3)	0.5/0.5	0 / 0	0.0/0.0	0.1/0.1	0.4/0.4	0.0/0.0	0.0/0.0
Alternative E							
Winter Quarters (1)	16.1/12.4	3 / 2	0.6/0.4	6.2/6.2	9.6/6.2	0.3/0.0	0.7/0.0
(with Segments 19* and 23*)	20.2/12.4	4 / 2	0.8/0.4	7.4/6.2	12.5/6.2	0.3/0.0	0.7/0.0
Winter Quarters (2)	17.2/12.2	6 / 5	2.6/2.2	5.7/5.7	11.2/6.5	0.3/0.0	0.7/0.0
(with Segment 19*)	20.0/12.2	7 / 5	2.8/2.2	6.4/5.7	13.3/6.5	0.3/0.0	0.7/0.0

potential erodible soils occur along the entire route. Approximately 0.7 mile of unstable land is located near Gooseberry Creek along the existing pipeline (Segment 12*), and 0.2 mile of unstable land occurs along the slope north of Burnout Canyon (Segment 3b) that would be crossed by new pipeline. This route would lie adjacent to approximately 2.7 miles of riparian area in Upper Huntington Canyon. Pipeline construction would occur across wetland soils near 10 stream crossings in the riparian areas (9 stream crossings in Upper Huntington Canyon, 1 across stream in Burnout Canyon). Approximately 100 feet of wet soils would be crossed near a spring located on the hillslope south of the stream in Burnout Canyon (Segment 3b).

Alternative C - Burnout Canyon Route (2) - Pipeline construction would cross the same amount of high potential erodible soils as Burnout Canyon Route (1). The entire route would cross 9.4 miles of moderately erodible soils, but approximately 2.2 miles of potentially moderate erodible soils would be crossed by new pipeline. The length of the riparian area, unstable land, and streams that would be crossed by new pipeline would be the same as in the Burnout Canyon Route (1).

Alternative C - Burnout Canyon Route (3) - This route would cross the same amount of potentially erodible soils as Burnout Canyon Route (1) with the addition of 0.2 mile of potentially high erodible soils along Segment 24 in Upper Huntington Canyon. Pipeline construction would occur across approximately 0.5 mile of riparian area. Wetland soils occur near 3 stream crossings (2 stream crossings in Upper Huntington Canyon, 1 stream crossing in Burnout Canyon). The entire route would cross approximately 2.6 miles of unstable land of which 1.9 miles would be crossed by new pipeline construction.

Alternative C - Burnout Canyon Route (4) - The entire route would cross the same amount of potentially erodible soils as Burnout Canyon Route (2), with the addition of 0.2 mile of potentially high erodible soils along the bottom of Upper Huntington Canyon. The amount of unstable land, riparian area, and wetland soils that would be crossed by new pipeline construction would be the same as Burnout Canyon Route (3).

Alternative D - Gooseberry Route - This entire route contains 4.9 miles of potentially high erodible soils of which 1.4 miles would be crossed by new pipeline construction. Approximately 6.7 miles of potentially moderate erodible soils would be crossed during pipeline construction. The pipeline would cross approximately 0.6 mile of unstable land on the slope east of the Gooseberry graben along Segment 1, and on the north slope of Burnout Canyon along Segment 3. Approximately 0.2 mile of seep area with wet soils would be crossed on a slope east of Skyline Drive along Segment 1. This route would lie adjacent to approximately 0.9 mile of riparian area in Upper Huntington Canyon. Pipeline would be constructed across wetland soils near 6 stream crossings in the riparian areas (4 stream crossings in Upper Huntington Canyon, 1 across stream in Burnout Canyon and 1 at Gooseberry Creek). Approximately 100 feet of wet soils would be crossed near a spring located on the hillslope south of the stream in Burnout Canyon (Segment 3b).

Valley Camp Triangle Connectors (1 through 3) - All of the connectors would cross approximately 0.1 mile of potentially high erodible soils at the east end of Segments 9 or 10*. The remainder of the area contains potentially moderate erodible soils. Springs and seeps are present. No riparian area or stream crossings would occur.

Alternative E - Winter Quarters Route (1) - Approximately 6.2 miles of potentially high erodible soils would be crossed during construction. There would be approximately 6.2

miles of potentially moderate erodible soils crossed by new pipeline. Approximately 0.7 mile of unstable land occurs along the existing pipeline near Gooseberry Creek along Segment 12*. No other unstable land areas or seeps would be crossed along this route. Wetland soils would be crossed along approximately 0.3 mile on pasture land south of Scofield and at the mouth of Winter Quarters Canyon. There would be 2 stream crossings by new pipeline. Associated Segments 19* and 23* cross approximately 1.2 miles of potentially high erodible soils and 2.9 miles of potentially moderate erodible soils. Wetland soils are present in the riparian area adjacent to Mud Creek. No unstable areas or seeps are present along these segments.

Alternative E - Winter Quarters Route (2) - This route would cross approximately 5.7 miles of potentially high erodible soils during construction. Approximately 6.5 miles of potentially moderate erodible soils would be crossed by new pipeline. No unstable land areas or seeps would be crossed by new pipeline. The length of wetland soils that would be crossed would be the same as Winter Quarters Route (1). There would be 5 stream crossings by new pipeline. Segment 19*, associated with this alternative, crosses approximately 0.7 mile of potentially high erodible soils and 2.1 miles of potentially moderate erodible soils. Wetland soils are present in the riparian area adjacent to Mud Creek. No unstable areas or seeps are present along this segment.

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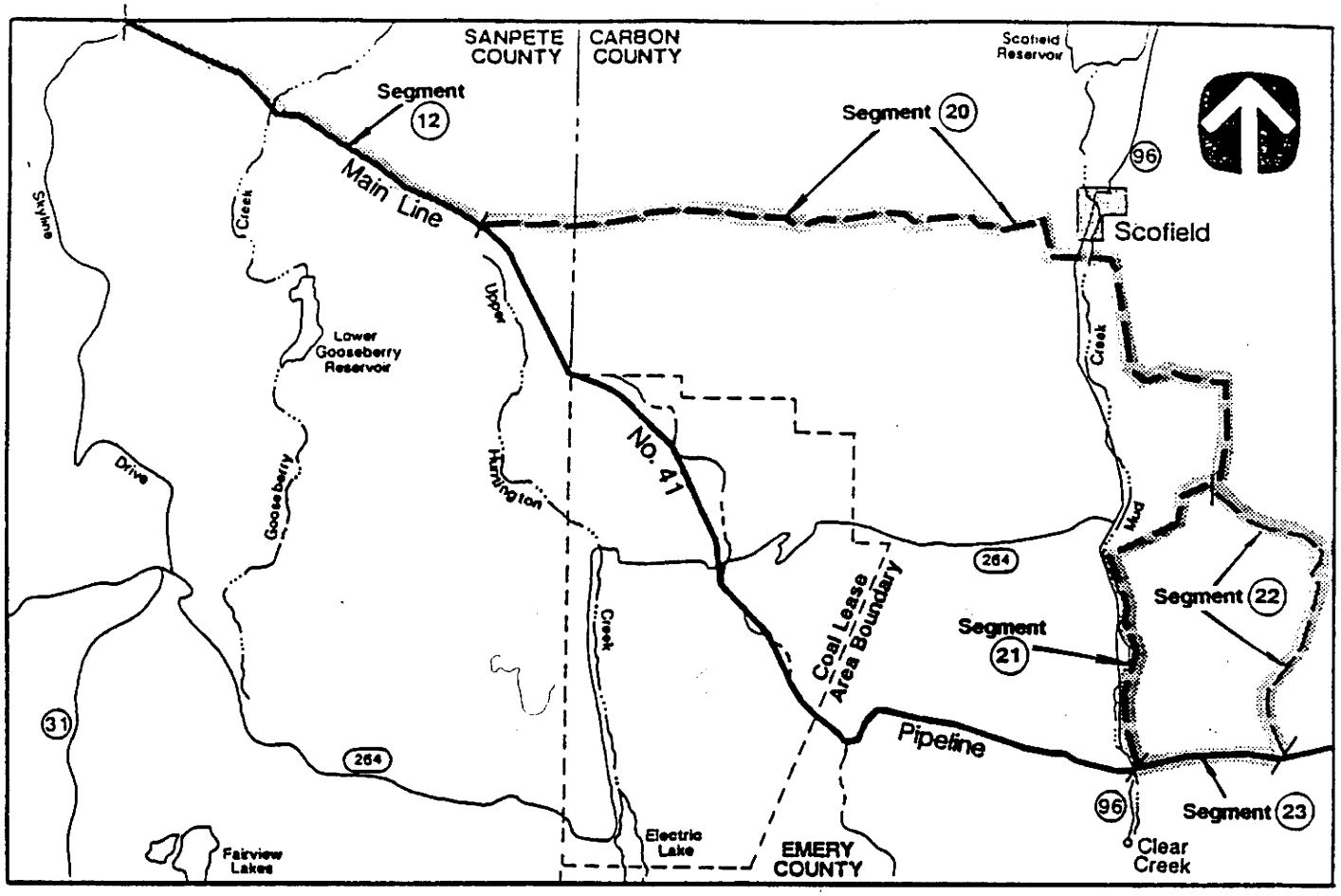

FIGURE B-4. THE WINTER QUARTERS ROUTE

Segments 12*, 20, 21, 23*; variation Segment 22; associated Segment 19*

Segment 12* (3.7 miles in length) is part of the existing pipeline and for purpose of this study begins in the northwest quarter of Section 25, T.12 S., R.5 E. (SLM) at the headward side of the Cabin Hollow Creek Drainage. The pipeline trends southeasterly from near the junction of Skyline Drive and an unimproved two-track road, the latter of which runs adjacent to the pipeline for one-half mile before turning south. One-third mile thereafter, the pipeline begins descending some 1,000 feet in elevation over the next mile to the crossing at Gooseberry Creek, then ascends nearly 1,400 feet over the remaining 2.2 miles.

An unimproved two-track road roughly parallels the pipeline for some 2.6 miles beginning about 0.4 mile west of the Gooseberry Creek crossing to the eastern end of Segment 12*. The roadway crosses the pipeline at numerous locations along the segment.

Segment 20 (9.1 miles in length) trends east/west for approximately two-thirds of its proposed length along the upland reaches of Winter Quarters Ridge before descending just west of Scofield to crossings situated at an unimproved two-track road, Winter Quarters Creek and Mud Creek. After skirting the southern corporate limits of Scofield, the segment turns southward just east of Mud Creek atop the ridgeline separating Pleasant Valley on the west and UP Canyon to the east for the distance of 1.1 miles. At

that point, the proposed segment turns east for .75 mile and then south for the remaining distance.

An unimproved two-track road would run adjacent to the proposed pipeline segment from the vicinity of Scofield to the junction with either Segment 21 or 22.

Segment 21 (3.1 miles in length) descends the ridgeline north of Broads Canyon crossing along its course 2 unimproved roads and the stream at the mouth of Broads Canyon before reaching and crossing Mud Creek. The proposed pipeline segment then runs upstream adjacent to and west of Mud Creek until the mouth of Slaughter House Canyon where the pipeline crosses to the east side of the creek near an existing highway culvert. The segment then continues upstream to connect with the existing pipeline just east of Utah State Highway 96.

Segment 23* (1.3 miles in length), part of the existing pipeline, differs in elevation by over 1,200 feet between the western end (lowest) and eastern end (highest) of the segment. The pipeline follows the ridgeline between Boneyard Canyon on the north and Magazine Canyon to the south and continues eastward to a topographic feature referred to as "The Elbow". This location marks the eastern extent of the proposed pipeline reroute project and is situated in the southwestern quarter of Section 27, T.13 S., R.7 E. (SLM).

Segment 22 (3.3 miles in length) is an eastern alternative for the Winter Quarters Route. The proposed segment instead of descending along the ridgeline of Broads Canyon like Segment 21, sidles eastward and southward along the upper reaches of Broads Canyon before rejoining the existing pipeline at "The Elbow". Unimproved two-track roads exist adjacent to the proposed pipeline alignment.

Segment 19* (2.8 miles of existing pipeline) is not a part of either Winter Quarters Routes (1) or (2). However, if either of these routes is selected, the existing pipeline of Segment 19* cannot be abandoned as it is needed to supply gas to a tap line that joins Main Line No. 41 at the western terminus of Segment 19*. Because this segment cannot be abandoned, the environmental resources are addressed along Segment 19* not as part of the routes, but as a segment associated with the route.

The first one-half mile on the western end of Segment 19* trends northeasterly before turning in a southeasterly direction. The southeastern component follows the ridgeline between Slaughter House Canyon on the north and Boardinghouse Canyon to the south and crosses and runs parallel to a unimproved road for nearly 0.5 mile at the western end of the component. At the eastern end of the segment, the topography descends nearly 1,100 feet over the last 0.5 mile, crossing State Highway 96 and Mud Creek near the junction with Segment 23*.

Winter Quarters Canyon
Data Adequacy

October 1992

UNITED STATES DEPT. OF AGRICULTURE
MANTI-LA SAL NATIONAL FOREST
ALLUVIAL VALLEY FLOORS AND
NATURAL RESOURCES WATERS LETTER

D. Kelly

United States Department of Agriculture | Forest Service | Manti-LaSal N.F.

To: 2820 Leases, Permits and Licenses
2530 Hydrologic Surveys, Prescriptions, and Plans

Date: January 11, 1983

Subject: Alluvial Valley Floors and Natural Resource Waters

To: William H. Boley, Forest Engineer

Our Environmental Assessments routinely state that we have no alluvial valley floors and no national resource waters. Research of the regulations and literature defining these terms indicate that national resource waters do not occur on the Manti-LaSal National Forest.

The Environmental Protection Agency, in its Guidelines for State and Areawide Water Quality Management Program Development of 1976, indicates (page 5-14 attached) that national resource waters are listed by the State. None have been listed on the Manti-LaSal National Forest and based on the guidelines, none are likely to be listed.

The Coal Regulations, CFR Title 30, paragraph 785.19, defines alluvial valley floors as being areas of river or stream deposits in "arid or semi-arid regions of the United States west of the 100th meridian." Restrictions apply if these areas are used for undeveloped rangeland and the grazing is a significant part of the farm operation. Arid and semi-arid is a climatic classification. Koppen's classification of climates determines arid and semi-arid areas by an analysis of temperature and precipitation data.

Based on Jim Anderson's analysis of mean annual temperature vs. elevation and on the Statewide precipitation map, small areas (about 1 section) in the mouths of Rock Canyon, Ferron Canyon, and Muddy Creek within the National Forest boundary may be considered alluvial valley floors.

A graph is attached showing the relationship between elevation, precipitation, and climate class.

G. Dennis Kelly

G. DENNIS KELLY
Hydrologist

Manti Division is generally Not classed as Arid or semi Arid.

Enclosure

cc: J. Frandsen
J. Lucero
S. Hotchkiss
J. Patten
M. McBrien
D. Kelly

§ 785.19 Surface coal mining and reclamation operations on areas or adjacent to areas including alluvial valley floors in the arid or semi-arid areas west of the 100th meridians

(a) *Scope.* This section applies to each person who conducts or intends to conduct surface coal mining and reclamation operations in, adjacent to or under a valley holding a stream in the arid or semi-arid regions of the United States west of the 100th meridian.

(b) No person shall engage in surface coal mining and reclamation operations subject to this section, except under a permit issued by the regulatory authority in accordance with this section.

(c) *Alluvial valley floor determination.* (1) Before applying for a permit to conduct, or before conducting surface coal mining and reclamation operations within a valley holding a stream or in a location where the adjacent area includes any stream in the arid or semi-arid regions of the United States, the applicant shall either affirmatively demonstrate, based on available data, the presence of an alluvial valley floor, or submit to the regulatory authority the results of a field investigation of the proposed mine plan area and adjacent area. The field investigations shall include sufficiently detailed geologic, hydrologic, land use, soils, and vegetation studies on areas required to be investigated by the regulatory authority, after consultation with the applicant, to enable the regulatory authority to make an evaluation regarding the existence of the probable alluvial valley floor in the proposed mine plan area or adjacent area and to determine which areas, if any, require more detailed study in order to allow the regulatory authority to make a final determination regarding the existence of an alluvial valley floor. Studies performed during the investigation by the applicant or subsequent studies as required of the applicant by the regulatory authority, shall include an appropriate combination, adapted to site-specific conditions, of—

(i) Mapping of unconsolidated stream-laid deposits holding streams

including, but not limited to, geologic maps of unconsolidated deposits, and stream-laid deposits, maps of streams, delineation of surface watersheds and directions of shallow ground water flows through and into the unconsolidated deposits, topography showing local and regional terrace levels, and topography of terraces, flood plains and channels showing surface drainage patterns.

(ii) Mapping of all lands included in the area in accordance with this paragraph and subject to agricultural activities, showing the area in which different types of agricultural lands, such as flood irrigated lands, pasture lands and undeveloped rangelands, exist, and accompanied by measurements of vegetation in terms of productivity and type.

(iii) Mapping of all lands that are currently or were historically flood irrigated, showing the location of each diversion structure, ditch, dam and related reservoir, irrigated land, and topography of those lands.

(iv) Documentation that areas identified in this paragraph are, or are not, subirrigated, based on ground water monitoring data, representative water quality, soil moisture measurements, and measurements of rooting depth, soil mottling, and water requirements of vegetation.

(v) Documentation, based on representative sampling, that areas identified under this paragraph are, or are not, flood irrigable, based on streamflow, water quality, water yield, soils measurements, and topographic characteristics.

(vi) Analysis of a series of aerial photographs, including color infrared imagery flown at a time of year to show any late summer and fall differences between upland and valley floor vegetative growth and of a scale adequate for reconnaissance identification of areas that may be alluvial valley floors.

(2) Based on the investigations conducted under paragraph (c)(1) of this section, the regulatory authority shall make a determination of the extent of any alluvial valley floors within the study area and whether any stream in the study area may be excluded from further consideration as lying within an alluvial valley floor. The regulatory authority shall determine that an alluvial valley floor exists if it finds that—

(i) Unconsolidated streamlaid deposits holding streams are present; and,

(ii) There is sufficient water to support agricultural activities as evidenced by:

(A) The existence of flood irrigation in the area in question or its historical use;

(B) The capability of an area to be flood irrigated, based on stream-flow water yield, soils, water quality, and topography; or,

(C) Subirrigation of the lands in question, derived from the ground water system of the valley floor.

(d) *Application contents for operations affecting designated alluvial valley floors.* (1) If land within the proposed permit area or adjacent area is identified as an alluvial valley floor and the proposed mining operation may affect an alluvial valley floor or waters that supply alluvial valley floors, the applicant shall submit a complete application for the proposed mining and reclamation operations, to be used by the regulatory authority, together with other relevant information, including the information required by paragraph (c) of this section, as a basis for approval or denial of the permit. The complete application shall include detailed surveys and baseline data required by the regulatory authority for a determination of—

(i) The characteristics of the alluvial valley floor which are necessary to preserve the essential hydrologic functions during and after mining;

(ii) The significance of the area to be affected to agricultural activities;

(iii) Whether the operation will cause, or presents an unacceptable risk of causing, material damage to the quantity or quality of surface or ground waters that supply the alluvial valley floor;

(iv) The effectiveness of proposed reclamation with respect to requirements of the Act, this chapter and the regulatory program; and

(v) Specific environmental monitoring required to measure compliance with 30 CFR Part 822 during and after mining and reclamation operations.

80-099 O—81——34

Winter Quarters Canyon
Data Adequacy

October 1992

SOIL AND LAND USE INVENTORIES
SCHOFIELD PROJECT: UCO, INC.

GROUND COAL MINING PERMIT APPLICATION

SCOFIELD MINE

CARBON COUNTY, UTAH

UCO, Inc.
7355 E. Orchard Rd.
Suite 100
Englewood, Colorado 80111

September, 1982

James P. Walsh & Associates, Inc.
Surficial Geology/Soils/Land Use

SOIL AND LAND USE INVENTORIES

SCOFIELD PROJECT: UCO, INC.

CARBON COUNTY, UTAH

June 1981

Updated July 30, 1982

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1.0 INTRODUCTION

1.1 PURPOSE

Soil and land-use inventories were made of UCO, Inc.'s proposed underground coal mine, the Scofield Mine. The soil inventory was conducted to provide soil resource information to meet the requirement of the Utah Division of Oil, Gas and Mining regarding surface effects of underground coal mining activities as set forth in the Utah Mining and Reclamation Permanent Program, Chapter I, Subchapter A, Part UMC 783.21. The land-use inventory was conducted to meet Part UMC 783.22 of the same regulatory program.

The mine and its facilities are to be located near the Town of Scofield in the Wasatch Plateau in central Utah. Scofield is located in Pleasant Valley (Figure 1), a grassy valley surrounded on the east, south, and west by hills. To the north of Scofield is Scofield Reservoir. The hills have a total relief of about 1500 to 1700 feet. The hills are generally forested on their north sides while the south sides are covered with grass and shrubs. The climate varies from subhumid on the north-facing slopes to semiarid on the south-facing slopes.

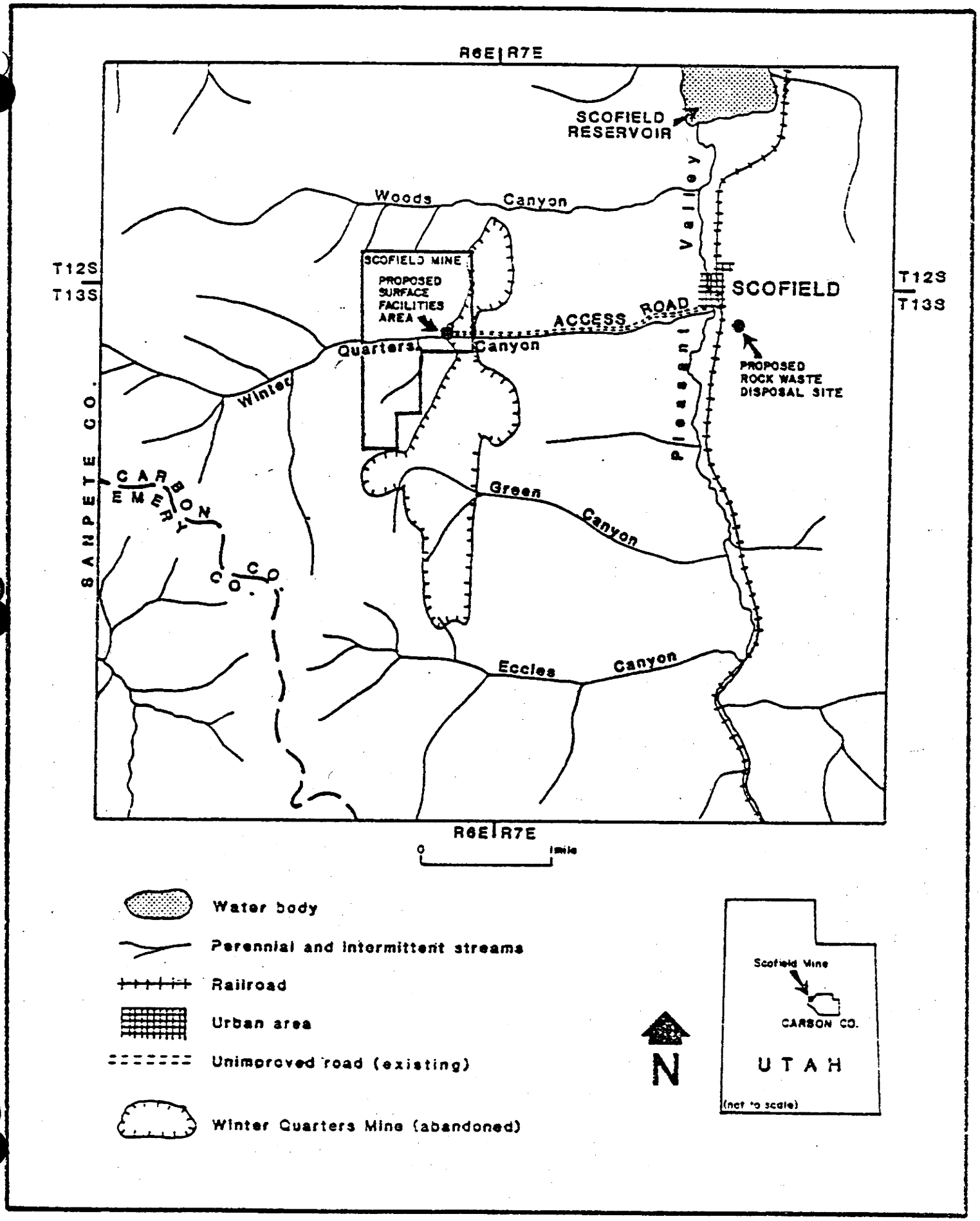
The mine project area is about 700 acres and includes areas to the west-southwest of Scofield. Areas to be disturbed include the surface facilities area at the mine entrance and a mine haul/access road. The surface facilities area will be in Winter Quarters Canyon adjacent to Winters Quarter Creek in the NE¼ of Sec. 1, T. 13 S., R. 6 E. (Figure 1). The haul/access road will follow the path of the present access road in Winter Quarters Canyon, connecting the surface facilities area and State Highway 96 due south of Scofield. The haul road will consist of widening the present access road and improving the road surface.

1.2 METHODS

1.2.1 Soil Inventory

First-order soil mapping of the areas to be affected (Figures 2 and 3) is a refinement of U.S.D.A. Soil Conservation Service (SCS) manuscript mapping, Carbon County, Utah. The SCS mapping is at a 2nd order level of intensity with a scale of 1:24,000. The SCS mapping in the site vicinity has a low amount of detail for a 2nd order survey and is comprised of broadly defined complexes. The base maps (Figures 2 and 3) used for the first-order mapping are enlarged aerial photographs at a scale of about 1:6,000 (1" = 500').

The detailed mapping was conducted during January 1981. Mapping was done by interpretation of aerial photographs based on field observations. Due to the mild winter there was no snow cover in Pleasant Valley and on the south-facing slopes in Winter Quarters



SCOFIELD MINE PROJECT AREA

FIGURE 1

Canyon. Most of the areas to be affected were bare of snow with the exception of parts of the bottom of Winter Quarters Canyon that had one foot of snow. However, field observations of the bare areas were limited by frozen soil.

Field observations consisted of traverses and sampling at the points labeled on the soil maps (Figures 2 and 3). Traverses were made along the access road which runs along the bottom of Winter Quarters Canyon and switchbacks up the hillside to the ridge top on the north side of the canyon. Soil profiles were exposed in Winter Quarters Canyon in a few stream cuts in the bottomland, a few gully and road cuts in the fans and footslopes, and along the continuous road cut in the hillside. Two backhoe pits were used to observe other soil profiles.

Six map units are used in this soil survey. One unit, RGF, is an SCS map unit. It occurs on north- and east-facing slopes that will be only slightly disturbed and so the level of detail given by the RGF unit is adequate. Because this survey is concerned with areas to be affected by surface disturbance, five new map units were named to provide more detail than the SCS map for those areas.

The major component soil series of the map units include four established series used by the SCS, a variant of a series used by the SCS, and an informal soil (CC). The CC soil was not mentioned in the SCS survey. The CC soil is an informal name used only in this survey; it is coined from the first letters of the subgroup and great group of its taxonomic classification, Cumulic Cryaquolls.

Typical profiles of the major soil series and the man-made fill in the areas to be affected were described in two backhoe pits (fill overlying CC, fill), one roadcut (Trag), and three auger holes (Silas, CC, Brycan coarse variant). The locations of these sampling points are shown on the soil maps. Two soil samples (#1 and #2), north of Scofield along the railroad tracks, were taken in that location because previous mine plans indicated surface disturbance there. Those plans have changed and that area will not be disturbed.

Several minor soils or soils to be only slightly affected were not sampled. The Falcon is a major soil of a unit (FaDE) which will only be slightly affected and so it was not sampled. Only about one-tenth acre of the FaDE unit will be disturbed by widening of the access road. The Croydon soil was not sampled because it will only be slightly disturbed. The Kunz soil is an inclusion in the TrE unit. It was not sampled because it is a minor soil and it is nearly identical to the sampled Trag, except its A horizon is thinner.

Profiles were sampled by horizon and analyzed for agronomic properties. Samples of the soil series and man-made fill were analyzed by Agricultural Consultants, Inc. of Brighton, Colorado. Parameters tested were particle size analysis (very fine sand, sand, silt, clay); textural class; saturated paste pH; electrical conductivity; saturation percentage; soluble calcium, sodium, and magnesium; sodium adsorption

ratio; organic matter; lime; and available potassium and phosphorus.

The soils in the areas to be affected are evaluated as a source of reconstruction material. The evaluation method used is that of the SCS. Each horizon of each major soil series is rated for reconstruction material. The evaluation is based on the field description, analytical data, SCS official soil series description, and SCS Soil Interpretations Record. From this evaluation, recommended depths of topsoil material for each soil are given. In addition, the susceptibilities of the soils to wind and water erosion are tabulated. Erodibility is important to the evaluation of soil reconstruction material and to soil handling.

1.2.2 Land-Use Inventory

The land-use inventory collected information about present and potential uses and local land-use classifications. Information about present land use was gathered by field observations and by contacting landowners. Potential uses of the soils were evaluated based on field observations and SCS Soil Interpretations Records. Evaluations for potential uses include: (a) capability classes for non-irrigated and irrigated land, (b) potential natural forage production for favorable, normal and unfavorable years, and (c) important tree species. Local land-use classifications were obtained from the planning department of Carbon County, Utah.

2.0 SOIL SERIES CHARACTERISTICS, CLASSIFICATION, AND GENESIS

Soil series characteristics are described in Table 2.1. Characteristics included are: depth; drainage class; slopes; landform; parent material; the color, texture, presence of lime and thickness of the surface, subsoil and substratum of a representative profile; native vegetation; permeability; available water-holding capacity; and effective rooting depth. Table 2.1 contains all the information normally included in the text of a series description in an SCS soil survey.

Detailed profile descriptions are presented in Attachments B and C. Descriptions of sampled soils (locations in Figures 2 and 3) are presented on a modified SCS field description form (form 232) using a tabular format and abbreviations to allow a pedologist to easily retrieve the information (Attachment B). The abbreviations (Attachment A) used are standard SCS abbreviations (Soil Conservation) Service: National Soils Handbook Part II 407.1(a)(3)iii; 1960; and 1951, p. 139).

SCS official soil series descriptions of the Croydon, Falcon, and Kunz soils, which were not sampled, are included in Attachment C. The Falcon soil is a major soil in the permit area but only a small acreage will be disturbed. The Croydon soil is a major soil which will not be disturbed. The Kunz soil is an inclusion in a map unit (TrE) that will be disturbed.

Climatic characteristics of the soil series as given by the SCS are presented in Table 2.2. Parameters include those in SCS official soil series descriptions. Also included are the data from the Town of Scofield U.S. Weather Bureau station at the dam on Scofield Reservoir. In several cases the given climatic ranges do not include the Scofield data. This is because the SCS is correlating these soils with other, similar soils first described elsewhere and the SCS has not yet revised the range of characteristics of the series.

Brief descriptions of the soil series and their characteristics pertinent to project development are presented in Section 2.1.

2.1 SOIL SERIES CHARACTERISTICS

2.1.1 Brycan Coarse Variant

The Brycan coarse variant consists of deep, well- or moderately well-drained, medium-textured soil. It occurs on alluvial fans and toeslopes in Winter Quarters Canyon. It is a variant because it is a member of the coarse-loamy rather than fine-loamy family. The mollic epipedon is usually thicker than allowed for the series. The profile sampled (profile no. 6) is located near the access road in Winter Quarters Canyon.

Table 2.1 Detailed Soil Series Descriptions

Soil Series (Map Unit Symbols)[a]	Depth	Drainage Class	Slopes	Landform and Parent Material	Representative Profile[b] Surface	Subsoil	Substratum	Native Vegetation	Permeability	Available[c] Water-Holding Capacity	Effective Rooting Depth
Bryson Variant (BrCD)	deep	well	sloping and mod. sloping	alluvial fans and footslopes; sheetwash and alluvium derived from clastic sedimentary rocks	v. dk. brn. calc. GR-L 8 in. thick	dk. brn SL 16 in. thick	v. dk. brn. SL 36 in. thick calc. from 38 to 60 in.	big sagebrush and rabbitbrush	mod.	7 1/2-9 in.	60 in. or more
CC soil[d] (SIAB)	deep	poor	level	alluvial bottomlands; alluvium derived from clastic sedimentary rocks	v. dk. brn. L 29 in. thick	---	v. dk.gr.brn. calc. L 25 in. thick	grasses, sedges, and sphagnum moss	mod. to mod. slow	9-12 1/2 in.	60 in. or more
Croydon[e] (CrE, HGF)	deep	well	steep	north-, east-, and southeast-facing hillslopes; colluvium and residuum derived mostly from sandstone	v. dk. brn and brn. L 22 in. thick	v. pale brn. CB-SICL 26 in. thick	sandstone and shale	aspen, peavine, grasses, subalpine fir, Engleman spruce	mod. slow	6 1/2-10 1/2 in.	45 in. or more
Falcon[f] (FaDE)	shallow	well	sloping to steep	ridge crests, ridge spurs and hillslopes; residuum derived mostly from sandstone	v. dk. brn ST-FSL 7 in. thick	gr. brn. GR-L 7 in. thick.	hard sandstone	grasses	rapid	1/2-1 1/2 in.	0-20 in.
Silas (SIAB)	deep	somewhat poor to poor	nearly level to level	alluvial bottomlands; alluvium derived from clastic sedimentary rocks	v. dk. brn. L 45 in. thick	brn. calc. SL 10 in. thick	brn. calc. CL 6 in. thick	grasses and sedges	mod.	9 1/2-11 1/2 in.	60 in. or more
Tray (TrE)	deep	well	steep	south-facing hillslopes; colluvium and residuum derived from clastic sedimentary rocks	v. dk. brn. FL-L 10 in. thick	brn. GR-CL 35 in. thick	yel. brn. calc. FL-CL 15 in. thick	big sagebrush, rabbitbrush, and bitterbrush	mod. slow	8 1/2-10 in.	60 in. or more

[a] Map units in which the soil is a major component
[b] Abbreviations for texture are the ones used on SCS form 5; those for moist color are from Low, 1977; both are in Attachment A.
[c] Inches of water to 60 inches depth or shallower restricting layer (Forest Service, 1974).
[d] Not an established series.
[e] Not sampled; does not occur in area to be affected; soil is more cobbly than the typical pedon of the SCS official soil series description.
[f] Not sampled; negligible occurrence in area to be affected.

Table 2.2

SOIL SERIES CLIMATIC CHARACTERISTICS

Soil Series (Map Unit Symbol)[a]	Elevation at site (feet)	Average Annual Precipitation (in.)	(cm.)	Mean Annual Air Temperature (°F)	(°C)	Mean Annual Soil[b] Temperature (°F)	(°C)	Ave. Ann. Frost-Free Season (days)
Brycan coarse variant (BrCD)	7700-8200	16-18	41-46	37-39	3-4	39-41	4-5	60-80
CC soil (SiAB)	7640-8200	- - - - - not available, similar to Silas - - - - - -						
Croydon[c] (CrE, RFG)	7800-9350	18-26	46-66	36-38	2-3	38-42	3-6	50-65
Falcon (FaDE)	7700-9120	16-22	41-56	36-40	2-4	45-47	7-8	40-65
Silas (SiAB)	7640-8200	16-22	41-56	37-39	3-4	40-44	4-7	40-60
Trag (TrE)	7700-9120	16-22	41-56	36-40	2-4	45-47	7-8	40-65
Scofield[d] Weather Station (7 yr. record)	about7700	15.4	39	36.5	2.5	---	---	55

[a]Map units in which the soil is a major component.
[b]At 20 inches (50 cm) depth.
[c]Croydon soil series is typically on north-facing slopes. Croydon soils on east-facing slopes are in the warm end of the range. Croydon soils on southeast-facing slopes are probably warmer than the range given here.
[d]Personal communication from Arlo Richardson, Utah State Climatology Office, Logan, Utah.

Note: Climatic information for soil series is from SCS manuscript map unit descriptions or from SCS Soil Series Descriptions; that given for Brycan coarse variant is from Brycan Soil Series.

2.1.2 CC Soil

The CC soil consists of deep, poorly drained, medium-textured soil. It occurs in alluvial valley bottoms in Winter Quarters Canyon and in Pleasant Valley. Two profiles were sampled, one from Pleasant Valley and one overlain by 3 feet of coal-rich fill near the proposed surface facilities area in Winter Quarters Canyon (profiles no. 1 and 3, respectively).

The CC soil is an informal soil name set up for the purpose of this survey. The CC soil is a member of the fine-loamy, mixed Cumulic Cryaquolls. It was too limited in extent to be included in the SCS soil survey.

2.1.3 Croydon Series

The Croydon series consists of deep, well-drained, medium-textured soil. It occurs on the north-, east-, and southeast-facing slopes, which tend to be the more cold, moist portion of the hillslopes that support trees. The north-facing slopes support fir and spruce trees and the east- and southeast-facing slopes support aspen trees. There is usually an O horizon present. The soil does not occur within the area to be affected and therefore was not sampled.

2.1.4 Falcon Series

The Falcon series consists of shallow, well-drained, moderately coarse textured soil underlain by hard, sandstone bedrock. It occurs on ridge crests and spurs, and in thin bands above sandstone strata on the hillsides. The Falcon soil usually appears as light areas on aerial photographs due to the low density of vegetation.

The profile described in the SCS official soil series description (Attachment D). differs from the soils at the project area in that it is a non-gravelly and gravelly coarse sandy loam. The soils at the project area are typically stony fine sandy loams.

About one-tenth acre of this soil in the FaDE map unit will be disturbed when the access road is widened. Other small areas included in the TrE map unit will be disturbed at the surface facilities area. The Falcon soil was not sampled because of the limited extent of proposed disturbance.

2.1.5 Silas Series

The Silas series consists of deep, somewhat poorly and poorly drained, medium-textured soil. It occurs in the valley bottom in Winter Quarters Canyon and in Pleasant Valley. The water table is at a depth of about 3

feet during the summer, according to SCS field observations (Earl Jensen, Soil Survey Party Leader, Carbon Co.; personal communication, 1981). The profile sampled (profile no. 2) is located north of Scofield along Denver and Rio Grande Western Railroad tracks.

2.1.6 Trag Series

The Trag series consists of deep, well-drained, medium-textured soil. It occurs on the south-facing slopes, which tend to be the more warm, dry hillslopes in Winter Quarters Canyon. Boulders over 5 feet in diameter in places occur in this soil. The substratum is either lime-enriched colluvium or soft shale that has been slightly modified by creep motion and root penetration. Root penetration of the soft shale indicates it is a favorable growth medium for plants. One profile (profile no. 4) with the deep colluvial substratum was sampled at the proposed surface facilities area in the canyon.

2.2 SOIL CLASSIFICATION AND GENESIS

The classification of the soils is tabulated in Table 2.3. The soil name, family and subgroup are given. Soil classification is defined in Soil Taxonomy (SCS, 1975).

The major soils, including the Croydon which occurs under forest, have a dark, organic-rich surface horizon (mollic epipedon) typical of soils formed under grass. The dark surface horizon of the Brycan coarse variant is thicker (Cumulic) than those on the hillsides because it occurs in accumulated sediments on alluvial fans. The surface horizons of the Silas and CC soils in the alluvial bottomlands are thick (Cumulic) because they occur in accumulated sediments. Their surface horizons are very rich in organic matter because their wet subsoils allow a greater production of vegetation than occurs on the other soils. The Silas and CC soils are subirrigated by the shallow groundwater table. The thick, dark, surface horizons of the Brycan coarse variant, CC, and Silas soils are indicative of geologically recent deposition of sediment. The surface horizon of these cumulative soils has grown thicker as the sediments accumulated.

Clay-enriched subsoil (argillic horizon) is a feature of the hillslope soils, Trag and Croydon. The associated, shallow (Lithic) Falcon soil lacks a clay-enriched subsoil. The Brycan coarse variant, CC, and Silas soils that formed in the young sediments of the fans and bottomlands and lack argillic horizons because they have not had much time to develop.

The soil temperature regimes found in the project area are the cryic and frigid regimes. The cryic soils are colder than the frigid during the summer. The principal factor affecting the soil temperature regimes is moisture, which is a function of aspect and depth to water table. Moisture increases the heat capacity of the soil and so wetter soils warm more slowly in the spring and are colder in the summer. Aspect influences soil moisture because it controls the amount of sunlight the

Table 2.3

CLASSIFICATION OF SOILS

Soil Series (Map Unit Symbols)[a]	Family	Subgroup
Brycan coarse variant (BrCD)	coarse-loamy, mixed	Cumulic Haploborolls
CC soil[b] (SiAB)	fine-loamy, mixed	Cumulic Cryaquolls
Croydon (CrE, RFG)	fine-loamy, mixed	Argic Cryoborolls
Falcon (FaDE)	loamy, mixed	Lithic Haploborolls
Silas (SiAB)	fine-loamy, mixed	Cumulic Cryoborolls
Trag (TrE)	fine-loamy, mixed	Typic Argiborolls

[a]Map units in which the soil is a major component.
[b]An informal soil; not an established series.

soil site receives. Sunlight increases evapotranspiration which leads to more rapid depletion of the soil moisture.

The cryic soils are the moister soils occurring on north- and east-facing slopes (Cryoborolls) and wet alluvial bottomlands with a high water table (Cryoborolls, Cryaquolls). The warmer frigid soils are on the south-facing hillslopes (Argiborolls, Haploborolls) and alluvial fans (Haploborolls). The south-facing hillslopes and alluvial fans are not forested so the soil receives more direct solar energy.

Soil temperature regime is important to this project because the cold summer temperature of the alluvial bottomlands (Silas and CC soils) makes them unsuitable for cultivated crops.

3.0 SOIL MAP UNITS

Soil map unit characteristics are described in Table 3.1. Characteristics included are: map unit symbol; name; major soil series and their percentages; minor inclusions; slopes and terrain; water erosion hazard for natural vegetation and bare soil; wind erosion hazard for bare soil; surface runoff; capability subclass; range site; and land use. Table 3.1 contains all the information included in map unit descriptions in SCS soil surveys. The information has been tabulated to make it concise; to make information retrieval easier; and to allow rapid comparisons between map units. Characteristics of the map units pertinent to project development are discussed below.

3.1 MAP UNIT BrCD - Brycan loam, coarse variant, 5 to 25 percent slopes

Due to previous mining, there has been substantial disturbance of this map unit on the north side of the creek in Winter Quarters Canyon. Most of the map unit was disturbed for foundations for the original mining community. Boulders and stones were used to make small retaining walls. Despite the disturbance, erosion has apparently been minimal; rilling is absent and gullying occurs only where it would occur naturally due to runoff from the higher hillslopes. Vegetation has reestablished itself to what appears visually to be a density equivalent to that on undisturbed Brycan coarse variant soils.

3.2 MAP UNIT CrE - Croydon loam, warm phase, 40 to 50 percent slopes

This map unit is similar to RGF except it occurs only on the southeast-facing slopes of generally south-facing canyon hillsides, whereas the RGF map unit is on the north- and east-facing slopes of generally north-facing canyon hillsides. One map unit of CrE occurs above the proposed surface facilities area in Winter Quarters Canyon.

3.3 MAP UNIT FaDE - Falcon stony fine sandy loam, 10 to 60 percent slopes

Only a small area of this unit will be disturbed. The disturbance will occur by widening the present access road in Winter Quarters Canyon where it crosses this unit for a short distance. Road widening may require some blasting since this unit usually overlies hard sandstone.

3.4 MAP UNIT RFG - Croydon loam, 30 to 50 percent slopes

This map unit occurs on north- and east-facing slopes on generally north-facing canyon hillsides. It supports a community of mixed aspen and conifers on the north-facing slopes and aspen on the east-facing slopes. It was not sampled because it will only slightly be disturbed.

Table 3.1 Soil Map Unit Characteristics

Map Unit Symbol	Name	Map Unit Components: Soil Series	Percent of Map Unit	Minor[a] Inclusions	Slopes and Terrain[b]	Water Erosion Hazard: Natural Vegetation	Water Erosion Hazard: Bare Soil	Wind Erosion Hazard for Bare Soil	Surface Runoff	Capability Subclass[d]	Range Site	Land Use
BrCD	Brycan loam, coarse variant, 5 to 25 percent slopes	Brycan coarse variant	85	15% Brycan L, 5-25% slopes	sloping and moderately sloping fans and toeslopes in canyon; all aspects; slopes are short to medium length and are convex to straight	slight to[c] mod.	mod.	low	medium	6E nonirrig. 4E irrig.	mountain loam	range, irrig. pasture
CrF	Croydon loam, warm phase, 40 to 50 percent slopes	Croydon	90	small areas of: Trag FL-L, 40-50% slopes; Pachic Argiboroll (fine-loamy, mixed) L, 40-50%	steep southeast-facing hillslopes in canyon; slopes are long and concave to straight	mod.	high	low	medium	7E[e] nonirrig.	NA	wooded[g] range
FaDX	Falcon stony fine sandy loam, 10 to 60 percent slopes	Falcon	80	10% rock outcrop and small areas of: mod. deep Falcon ST-FSL, 10-60% slopes; Kunz ST-L, 10-60% slopes	sloping to steep crests of ridges and ridge spurs; mostly south-facing; slopes are short and convex	mod.	high to mod.	medium	rapid	7E nonirrig.	mountain shallow loam	range
RCF	Croydon loam, 30 to 50 percent slopes	Croydon	85	Small areas of: Beardall ST-L, 45-50% slopes; Brycan L, 15-30% slopes; Trag CN-L 30-60% slopes	steep, north- and east-facing hillslopes; slopes are short and concave-convex	mod.	high	low	medium	7E nonirrig.	NA	wooded[g] range
SlAB	Silas-CC loams, 0 to 5 percent slopes	Silas	60	none	nearly level bottom of Pleasant Valley and narrow bottom in canyon; contains stream channels; aspect negligible; slopes are short and generally concave; Silas is on higher and CC is on lower spots	none	slight to[f] none	low	slow	6W nonirrig. 6W irrig.[e]	wet meadow	irrig. pasture, range
		CC	40			none	none	low	very slow	7W nonirrig. 7W irrig.[e]	wet meadow	irrig. pasture, range
TrE	Trag flaggy loam 40 to 60 percent slopes	Trag	60	15% Kunz BYX-L, 40-60% slopes; 15% Falcon ST-FSL, 40-60% slopes; 10% Pachic Argiboroll (fine-loamy,mixed) L, 40-60% slopes	steep, south-facing hillslopes in canyon; slopes are long and medium and are generally straight; Trag and Kunz occur throughout; Falcon occurs in linear areas above sandstone strata; Pachic Argiboroll occurs mostly in drainage-ways	mod.	high	low	rapid	7E[e] nonirrig.	NA	range

[a] Abbreviations are standard SCS textural ones used in Soil Interpretations Records (form 5). They are presented in Attachment A.

[b] The canyon referred to is Winter Quarters Canyon.

[c] The most serious erosion results from gullying, which is mainly influenced by the condition of the hillslopes above this unit.

[d] If no irrigated capability is given, the soil is unsuitable for irrigation.

[e] Information is site specific and differs from SCS Soil Interpretations Records.

[f] Hazard is greater in Winter Quarters Canyon where the steeper (3-5%) slopes occur.

[g] Wooded range is not presently being exploited for wood products.

NA - SCS data not available.

3.5 MAP UNIT SiAB - Silas-CC loams, 0 to 5 percent slopes

This unit occurs in valley bottoms and consequently there is a shallow water table at two or more feet depth. The CC soil occurs in the low, wetter spots and the Silas occurs on the high, drier spots. Local relief within the unit is only about 2 to 3 feet in Pleasant Valley and about 5 feet in Winter Quarters Canyon. Included in this map unit are stream channels and their channel deposits.

A significant portion of this unit is covered by man-made fill. The unit is covered by railroad ballast along the existing Denver and Rio Grande Western Railroad tracks. In Winter Quarters Canyon it is covered by railroad ballast along an abandoned railroad spur and coal-rich fill along the road.

The fill along the road in Winter Quarters Canyon has been described and analyzed (profiles 3 and 5 in Attachment B; located on Figure 2). The material is a mixture of coal waste and soil in varying proportions. The saturation percentages (Table 4.3) and the presence of naturally established vegetation indicate that most of the fill is a suitable plant-growth medium (see Section 4.1.3). However, the coal waste in the fill is a coarse-grained and somewhat droughty material by itself. To improve the available water-holding capacity of this material, soil can be added. Some of the fill already has sufficient soil mixed with it to be suitable as a soil reconstruction material.

3.6 MAP UNIT TrE - Trag flaggy loam, 40 to 60 percent slopes

This map unit is somewhat variable. There are several types of substratum material, three included soil series, and variations in the size and amount of rock fragments. The substratum of the Trag soil is either deep, stony colluvium or soft shale altered by root penetration and creep. It is not possible to map these separately.

The soil series inclusions consist of one contrasting soil and two similar soils in parallel families (SCS, 1967). The contrasting, shallow Falcon soil occurs in linear patches over sandstone strata. It appears as light spots on aerial photographs, but not consistently enough to be mapped. The similar Kunz soil inclusions are like the Trag except the A horizon is thinner. The Pachic Argiboroll, fine-loamy, mixed inclusions are similar to the Trag except the A horizon is thicker. The Pachic Argiboroll occurs mainly along hillside drainageways.

Sizes and amounts of rock fragments are about the same in the Trag, Kunz, and Pachic Argiboroll. Sizes include pea gravels to large boulders. Amounts vary from about 10 to 45 percent greater than 2 mm by volume.

Excavation in this map unit will be hindered by shallow depth of bedrock

underlying the Falcon soil and by occasional large boulders on the surface and in all the component soils. The Falcon soil can be stripped to bedrock. Where large boulders are present they should be removed prior to soil salvaging.

4.0 SOIL ASPECTS OF RECLAMATION

4.1 SOIL RECONSTRUCTION MATERIAL FOR DISTURBED LAND

4.1.1 Method of Evaluation

The criteria for evaluating soil as a plant growth medium suitable for reclaiming disturbed land are given in Table 4-1. The criteria include sodium adsorption ratio (SAR), salinity as indicated by electrical conductivity (EC), toxic materials, soil reaction (pH), available water-holding capacity, soil erodibility factor (K), wind erodibility group, texture, and coarse fragments.

Limits are given for good, fair or poor sources of reconstruction material. A good rating means vegetation is relatively easy to establish and maintain, the surface is stable and resists erosion, and the reconstructed soil has good potential productivity. Material rated fair can usually be vegetated and stabilized without modification. However, top dressing with better material or application of soil amendments to modify one or more properties may be used to increase performance of the fair material. Material rated poor should not be used for reclamation. Top dressing with better material may be necessary to establish and maintain vegetation over material rated poor.

4.1.2 Soil Chemical and Physical Properties

Chemical and physical data for the predominant soils of the areas to be affected were collected to evaluate the soils as a source of reconstruction material for disturbed lands and to provide baseline data on soil fertility. The methods used for soil chemical and physical analysis by Colorado Agricultural Consultants are reported in Table 4-2. The data are reported in in Table 4-3. The sampling locations are shown on the soil maps (Figures 2 and 3) by profile number. Other sources of information used to evaluate soils for reclamation are manuscript SCS soil survey information and Soil Interpretations Records. Parameters tested were particle size analysis (very fine sand, sand, silt, clay), textural class, saturated paste pH, electrical conductivity (EC), saturation percentage, soluble calcium, sodium and magnesium, sodium adsorption ratio (SAR), organic matter, lime, and available potassium and phosphorus.

Determinations of plant-available phosphorus and potassium were done to provide baseline data on the fertility status of the soils in accordance with the recommendations of the Utah Division of Oil, Gas and Mining (Guidelines for Management of Soils, Draft, 4/1/81). Phosphorus is important to root growth and helps to stimulate early plant growth which hastens maturity. Potassium is important to photosynthesis, helps to

Table 4.1

CRITERIA FOR SOIL RECONSTRUCTION MATERIAL FOR DISTURBED AREAS

Property	Limits Good	Fair	Poor	Restrictive Feature
1. Sodium Adsorption Ratio (SAR)	<5	5-12	>12	Excess sodium
2. Salinity (mmhos/cm)	<8	8-16	>16	Excess salt
3. Toxic Materials	low	medium	high	Toxicity
4. Soil Reaction (pH)	5.6-7.8	4.5-5.5	<4.5	Too acid
5. Soil Reaction (pH)	5.6-7.8	7.9-8.4	>8.4	Excess lime, Too alkaline
6. Available Water-Holding Capacity (in./in.)	>.10	0.5-.10	<.05	Droughty
7. Soil Erodibility Factor (K)	<.37	≥.37	---	Water erodibility
8. Wind Erodibility Group	> 3	3	1,2	Wind erodibility
9. USDA Texture	---	SCL,CL, SICL	C,[b] SIC,[b] SC	Too clayey
10. USDA Texture	---	LCOS,LS, LFS,LVFS	COS,S, FS,VFS	Too sandy
11. Coarse Frag. (wt. pct.)				
3-10 in.	<15	15-35	35	Large stones
>10 in.	< 3	3-10	10	Large stones

Adapted from National Soils Handbook, NSH - Part II (403.6(a)), (Soil Conservation Service, no date)

[a]Layers with high potential acidity should be rated poor.
[b]If in kaolinitic family, rate one class better if experience confirms.

Table 1.2

SOIL ANALYSES: METHODS

AGRICULTURAL CONSULTANTS INC
240 SOUTH FIRST AVE
PO DRAWER 507
BRIGHTON, COLORADO 80601
(303)-659-2313

DATE: JANUARY 30, 1981

REPORT TO: JAMES P. WALSH

COMPANY: JAMES P. WALSH & ASSOCIATES, INC., 465 GRAPE AVENUE, BOULDER, CO 80302

PROJECT ID: 30 UCO SOIL SAMPLES

DESCRIPTION OF ABBREVIATIONS USED FOR SOIL TEST REPORT COLUMN HEADINGS

PH- PASTE PH

EC- ELECTRIC CONDUCTIVITY, MMHOS/CC, , USDA HANDBOOK 60 CHAPT 6 (4) CONDUCTIVITY ELECTRODE/WHEATSTONE BRIDGE

SATZ- WATER HOLDING CAPACITY AT SATURATION , USDA HANDBOOK 60 CHAPT 6 (3D)

CA- CALCIUM, MEQ/L, , USDA HANDBOOK 60 CHAPT 6 (8)/QUANTITATION BY AAS

MG- MAGNESIUM, MEQ/L, , USDA HANDBOOK 60 CHAPT 6 (9)/QUANTITATION BY AAS

NA- SODIUM, MEQ/L, , USDA HANDBOOK 60 CHAPT 6 (10A)/QUANTITATION BY AAS

SAR- SODIUM ADSORPTION RATIO, , USDA HANDBOOK 60 CHAPT 5 (PP72)/QUANTITATION BY AAS

TEXT- TEXTURE CLASS, , USDA HANDBOOK 60 CHAPT 6 (42B)/ASTM D 422-72

SN- SANDY OR SAND (%), USDA DIAGRAM

SI- SILTY OR SILT (%), USDA DIAGRAM

CL- CLAY (%), USDA DIAGRAM

VFS- VERY FINE SAND (%), USDA DIAGRAM

OM- ORGANIC MATTER (HUMUS), % AMER SOC OF AGR #9

P- PHOSPHORUS (AVAILABLE POTASSIUM, PPM, AMER SOC OF AGR #9 NAHCO3 EXT

K- AVAILABLE POTASSIUM, PPM, AMER SOC OF AGR #9

LIME- LIME, % , USDA HANDBOOK 60 CHAPT 6 (23) CACO3 EQV

Table 4.3
SOIL ANALYSES: DATA

UCD SOILS/HOLE NUMBER 1 CC soil

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT	SN	SI	CL	VFS	OM	LM	AK	P
UCD 1	0 TO 7	A11	6.6	1.9	66.4	3.14	8.30	5.02	1.2	SICL	6	52	42	6	6.5	1.2	870	8
UCD 1	7 TO 16	A12	6.7	1.5	42.3	2.47	7.56	3.15	1.1	SILO	20	60	20	17	6.2	1.1	350	3
UCD 1	16 TO 29	A13	7.3	1.2	41.0	2.50	7.65	1.59	1.2	LO	43	41	16	19	1.9	0.8	360	2
UCD 1	29 TO 42	C1	7.2	2.2	36.3	2.87	11.55	3.67	1.0	LO	27	47	26	14	2.3	1.6	310	2
UCD 1	42 TO 64	C2ca	7.7	1.7	43.3	1.61	9.25	3.08	0.6	LO	34	40	26	16	1.6	9.1	290	1

UCD SOILS/HOLE NUMBER 2 Silas Series

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT	SN	SI	CL	VFS	OM	LM	AK	P
UCD 2	0 TO 16	A11	7.3	1.9	39.6	3.51	9.09	3.37	1.4	LO	35	50	15	20	5.1	1.0	290	5
UCD 2	16 TO 24	A12	7.4	1.6	38.3	3.63	6.27	3.48	1.6	SILO	28	52	20	19	2.4	0.8	220	2
UCD 2	24 TO 35	A11b	7.4	1.2	43.0	2.43	5.58	1.55	1.3	SILO	23	51	26	16	2.2	0.8	250	2
UCD 2	35 TO 45	A12b	7.6	1.2	43.0	2.43	6.51	1.55	1.2	LO	34	47	19	19	2.0	0.9	240	1
UCD 2	45 TO 55	C1cab	7.9	1.5	37.8	2.76	8.46	1.76	1.2	LO	44	40	16	16	1.1	8.0	220	1
UCD 2	55 TO 61	C2cab	7.9	1.6	45.4	2.30	7.93	2.94	1.0	CLLO	28	42	30	14	1.6	0.2	320	3

UCD SOILS/HOLE NUMBER 3 Fill overlying CC soil

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT	SN	SI	CL	VFS	OM	LM	AK	P
UCD 3	0 TO 20	FILL1 & FILL2	6.9	2.6	35.0	1.99	13.04	1.53	0.7	SNLO	61	37	2	12	7.9	0.0	730	7
UCD 3	20 TO 35	FILL3 & FILL4	7.3	2.0	34.2	3.06	11.71	0.98	1.2	SNLO	56	33	11	14	5.3	1.7	420	3
UCD 3	35 TO 45	A11b1 & A12b1	7.2	1.4	36.3	2.07	8.81	0.92	1.3	SILO	24	58	18	17	4.9	0.9	310	1
UCD 3	45 TO 57	A11b2 & A12b2	7.4	1.1	37.0	2.82	6.48	0.90	1.5	LO	46	38	16	19	2.7	0.7	330	2
UCD 3	57 TO 68	A13b2	7.3	1.0	40.4	2.58	5.94	0.99	1.4	LO	35	43	22	11	3.4	0.8	360	1
UCD 3	68 TO 95	Cb2	7.2	1.8	37.1	3.75	9.71	1.80	1.6	LO	43	39	18	16	2.5	0.7	300	2

UCD SOILS/HOLE NUMBER 4 Tray Series

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT	SN	SI	CL	VFS	OM	LM	AK	P
UCD 4	0 TO 10	A1	7.2	1.1	39.4	2.65	4.06	1.69	1.6	LO	49	36	15	17	3.3	0.8	820	4

Table 4.3 continued

UCD	4	10 TO	19	B211	7.0	1.1	46.5	1.44	6.31	4.62	0.8	CLLO	32	36	32	11	1.3	0.7	780	6
UCD	4	19 TO	45	B221	7.4	1.2	37.8	1.69	7.68	4.33	0.9	LO	38	38	24	16	1.1	0.9	410	2
UCD	4	45 TO	60	BJCA	7.7	1.5	39.9	2.62	8.02	1.67	1.2	LO	37	39	24	16	0.9	2.5	240	1
UCD	4	90 TO	100	Cca	8.0	1.2	38.3	2.72	7.31	1.74	1.3	LO	49	34	17	16	0.8	4.6	270	2

UCD SOILS/HOLE NUMBER 5 FILL

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT.	SN	SI	CL	VFS	OM	LM	AK	P
UCD 5	0 TO 13	FILL1	7.0	2.0	36.9	1.88	8.66	1.80	0.8	LO	40	40	20	14	5.7	1.5	1030	4
UCD 5	13 TO 35	FILL2 & FILL 3	7.3	2.2	37.9	2.76	11.58	1.76	1.1	SNLO	58	31	11	14	7.5	5.5	600	1
UCD 5	35 TO 66	FILL4 & FILL 5	7.3	1.4	36.4	3.83	7.70	1.83	1.8	LO	41	42	17	17	4.5	1.2	400	1
UCD 5	66 TO 75	Cb	7.3	1.2	42.1	3.30	4.75	1.58	1.9	LO	47	38	15	17	4.1	1.0	440	1

UCD SOILS/HOLE NUMBER 6 Brycan coarse variant

HOLE NO.	DEPTH IN.	HORIZON	PH	EC	SATX	NA	CA	MG	SAR	TEXT	SN	SI	CL	VFS	OM	LM	AK	P
UCD 6	0 TO 8	A11 & A3	7.4	1.5	41.8	2.50	6.70	1.59	1.2	LO	44	42	14	20	5.2	2.3	590	3
UCD 6	8 TO 24	B2	7.5	1.8	33.6	3.11	3.57	5.96	1.4	SNLO	66	23	11	11	1.8	0.6	890	1
UCD 6	24 TO 38	C1	7.7	2.4	33.4	3.12	4.79	5.99	1.3	SNLO	65	26	9	16	2.0	0.9	1090	1
UCD 6	38 TO 60	C2	8.0	2.7	35.3	2.96	4.54	5.67	1.3	SNLO	55	33	12	16	1.5	1.2	1470	1

stimulate root growth, and promotes disease resistance. Evaluations of whether values are high, medium, or low are dependent on the plant species selection (Barrett et al., 1980) in the reclamation plan. Therefore, relative ratings of available phosphorus and potassium levels are not given here.

4.1.3 Suitability as a Source Material for Reclamation of Disturbed Lands

Table 4.4 is an evaluation of soil reconstruction material for each horizon of the soils in the area to be affected. The evaluation is based on the soil chemical and physical data in Table 4.3 using the criteria of Table 4.1. The soils are rated good, fair, or poor sources of reconstruction material. The overall rating given for each horizon is the rating for the most limiting criterion. Depths of suitable material are summarized in Table 4.5.

The soils are nonsaline and nonsodic. Sodium adsorption ratio (SAR) is less than 1.6 for all samples tested. The EC is 2.7 or less for all samples tested. The soils are rated good for SAR and EC.

The soils are rated good for toxic materials. Some elements, such as boron and selenium, can be deleterious to plants or the animals that feed on them. Boron accumulates with salts in saline soils. Since these soils are nonsaline they are judged to be low in boron. No selenium plant indicators (Astragalus) were found at the site and so the soils are judged to be low in selenium (Barrett et al., 1980).

The soils have favorable reactions, as measured by pH. Excessively high or low pH may cause problems in establishing protective vegetation and influence the erodibility of the surface. The soils are rated good to fair for pH. The substrata of Silas and Brycan coarse variant are rated fair with a pH of 7.9 to 8.0. The slightly high pH is due to a slight excess of lime.

Available water-holding capacity (AWHC) is a measure of the moisture available to plants in the soil profile. AWHC is estimated based on field texture and percent coarse fragments (Forest Service, 1974) for most of the soils and by the SCS Soil Interpretations Record for the Falcon series. Estimations of AWHC can be checked by a relative comparison of the values of the saturation percentage, because soils with larger AWHC have a larger saturation percentage (Salinity Laboratory Staff, 1969).

The soils have good available water-holding capacity except the Falcon and the fill material, which are rated fair. These materials are rated fair because their sandy textures cannot hold much available water. This problem can be ameliorated by mixing of these materials with the other, finer-textured soils.

The soils of the project area are rated good to fair for water

Table 4.4

EVALUATION OF SOIL RECONSTRUCTION MATERIAL FOR AREAS TO BE DISTURBED

Soil Series (Map Unit Symbols)[a]	Horizon	Depth (in.)	SAR	Salinity	Toxic[b] Materials	Soil Reaction	Available Water-Holding Capacity	Erosion Factor (K)	Wind Erodibility Group	USDA Text.	Coarse Frags.	Overall Rating
Drycan	A11 & A3	0- 8	good	good	good	good	good	good	good	good	good	GOOD
Coarse	B2	8-24	good	good	good	good	good	good	fair	good	good	FAIR
Variant	C1	24-38	good	good	good	good	good	good	fair	good	good	FAIR
(GrCD)	C2	38-60+	good	good	good	fair	good	good	fair	good	good	FAIR
Croydon[c]	--	0-22	good	good	good	good	good	good	good	good	fair	FAIR
Beams	--	22-48	good	good	good	good	good	good	good	fair	fair	FAIR
(CrE,RGF)	--											
CC soil	A11	0- 7	good	good	good	good	good	good	good	good	good	GOOD
(AlB)	A12	7-16	good	good	good	good	good	good-fair	good	good	good	GOOD-FAIR
	A13	16-29	good	good	good	good	good	good-fair	good	good	good	GOOD-FAIR
	C1	29-42	good	good	good	good	good	fair	good	good	good	FAIR
	C2	42-64+	good	good	good	good	good	fair	good	good	good	FAIR
Falcon[c]	A1	0- 7	good	good	good	good	fair	good	fair	good	fair	FAIR
(FaBE)	C	7-14	good	good	good	good	fair	good	fair	good	fair	FAIR
Silas	A11	0-16	good	good	good	good	good	good	good	good	good	GOOD
(SlAB)	A12	16-24	good	good	good	good	good	fair	good	good	good	FAIR
	A11b	24-35	good	good	good	good	good	fair	good	good	good	FAIR
	A12b	35-45	good	good	good	good	good	fair	good	good	good	FAIR
	C1cab	45-55	good	good	good	fair	good	fair	good	good	good	FAIR
	C2cab	55-61+	good	good	good	fair	good	good	good	fair	good	FAIR
Trag	A1	0-10	good	good	good	good	good	good	good	good	fair	FAIR
(TrE)	B21t	10-19	good	good	good	good	good	good	good	fair	fair	FAIR
	B22t	19-45	good	good	good	good	good	good	good	fair	fair	FAIR
	B3ca	45-60+	good	good	good	good	good	good	good	fair	fair	FAIR

[a] Map units in which the soil is a major component.

[b] See discussion in text, section 5.2.

[c] Not sampled; minor occurrence in area to be disturbed; evaluation based on SCS Soil Interpretation Record and field observations.

Table 4.5

DEPTHS OF SUITABLE TOPSOIL MATERIAL
FOR AREAS TO BE DISTURBED
(by map unit)

Map Unit Symbol	Components	Percent of Map Unit	Depth (in.)	Rating	Recommended Depth of Suitable Material (restrictive feature)
BrCD	Brycan coarse variant	85	0- 8 8-60+	good fair	60 in. (wind erodibility, alkaline pH)
	Brycan	15	0-60+	good-fair	60 in. (alkaline pH in substratum)
CrE	Croydon	90	0-48	fair	48 in. (large stones)
	other soils	10	variable	variable	to bedrock
FaDE	Falcon	80	0-14	fair	10 in. or to rock (large stones, wind erodibility, droughty)
	Rock Outcrop	10	0	no soil	---
	mod. deep Falcon	0-10	0-30	fair	(large stones, wind erodibility, droughty)
	Kunz	0-10	0-50	fair	(large stones, clayey)
RGF	Croydon	85	0-48	fair	48 in. (large stones)
	other soils	15	variable	variable	to bedrock
SiAB	Silas	60	0-16 16-61+	good fair	60 in. (water erodibility, excess lime, clayey)
	CC soil	40	0- 7 7-29 29-64+	good good-fair fair	60 in. (water erodibility)
TrE	Trag	60	0-60+	fair	60 in. (large stones, clayey)
	Falcon	15	0-14	fair	10 in. or to rock (large stones, wind erodibility, droughty)
	Kunz	15	0-60+	fair	60 in. (large stones, clayey)
	Pachic Argiboroll,	10	0-60+	fair	60 in.

erodibility (Table 4.4). Water erodibility is indicated by the K factor (Table 4.6), which is explained more fully in Section 4.2. K values for sampled soils are calculated using the laboratory data in Table 4.3 (Wischmeier and Smith, 1978). K values for the Falcon series are from the SCS Soil Interpretations Record.

The subsoil of Silas and subsoil and substratum of the CC soil are rated fair for water erodibility. The higher water erodibility is due to their high content of silt and very fine sand. Their surface horizons are less erodible because the large amount of organic matter binds the particles together. Water erodibility of these soils is not expected to be a problem because their subsoils will not be disturbed, and the terrain at the proposed railroad loadout is nearly level. The subsoil and substratum of Trag are not erodible because their high content of coarse fragments acts as a mulch (Wischmeier and Smith, 1978, p. 10).

The soils of the site are rated good to fair for wind erodibility. Wind erodibility is rated from the wind erodibility group (WEG; see Section 4.2). The sandy loams of the Falcon soil and the subsoil and substratum of the Brycan coarse variant are rated fair.

Soil textures at the site are rated good to fair. Texture influences available water-holding capacity, erodibility by wind or water, soil structure, consistence, water intake rate, runoff, fertility, workability, trafficability, and potential slippage hazard. The Trag below 10 inches is rated fair because the horizons are clay loams. This will be ameliorated during stripping by mixing of these horizons with the less clayey surface of Trag and with the sandy loam of the Falcon soil which is included in the TrE map unit. The Silas below 55 inches is rated fair; the substratum will not be affected, however.

The Brycan variant, CC, and Silas soils are rated good for coarse fragments; the Falcon and Trag are fair. Coarse fragments influence the ease of excavation, stockpiling, respreading, and suitability for the final land use. A certain amount of coarse fragments can be tolerated depending upon the size and the intended use of the reclaimed area. Evaluations of coarse fragments are based on profile descriptions for the sampled soils and on the SCS Soil Interpretations Record for the Falcon series. Coarse fragments are a restrictive feature for the Trag and Falcon series and minor included soils on the hillslopes. In some areas these soils have large stones and boulders. Although coarse fragments of the soils on the hillslopes reduce their workability, they will be advantageous for minimizing erosion on topsoil stockpiles and redressed soil on steep slopes.

The fill material left from the previous mining (profiles 3 and 5, not shown in Table 4.4) is good to fair for soil reconstruction material with the exception of the top 2 horizons of profile 3. These fill horizons are too droughty, but the problem could be rectified by mixing in some finer-textured topsoil. The fair rating for some other fills (fill horizons 2 to 5 in profile 5) is due to moderate wind or water erodibility which is partly due to the properties of the admixed soil.

The overall ratings of the soils are good to fair. There will be plenty of soil reconstruction material. Overall, all the soils are rated good to fair to a depth of 60 or more inches, except for the shallow Falcon series. Except for the Falcon, the soils can be stripped to the depth required for an adequate volume of reclamation material.

4.2 SOIL ERODIBILITY

Soil erodibility is an important consideration in the selection of suitable soil reconstruction material and in reclamation planning. Erodibility can affect the success of reclamation and the amount of sediment generated by disturbance. The water erodibility factor (K) and wind erodibility group (WEG) were calculated (Table 4.6) to evaluate soil reconstruction material (Section 4.1.3) and for use in reclamation planning.

The water erodibility of soils (K factor) is calculated using the parameters of: percentages of silt, very fine sand, coarser sands, organic matter and coarse fragments; soil profile permeability; and type of soil structure (Wischmeier and Smith, 1978). Particle sizes and organic matter were measured in the laboratory. Coarse fragments, permeability and structure were estimated in the field. The larger the K factor, the greater is the susceptibility of the soil to water erosion. Other factors that must be considered in assessing water erosion on the site are rainfall intensity, slope steepness, length and shape, vegetative and plant litter cover, and erosion control practices.

The wind erodibility group (WEG) is estimated using SCS criteria based upon texture, presence of lime and coarse fragments (Forest Service, 1979). Wetness was not considered here, though it is by the SCS, because soils will dry out if they are stockpiled. The smaller the WEG number, the greater is the wind erodibility. Other factors important in assessing wind erosion at the site are the roughness of the soil, wind velocities, dryness of the soil surface, sheltering effects of woodlands and topographic rises, and vegetative and plant litter cover (Barrett et al., 1980).

4.3 SOIL HANDLING

In Winter Quarters Canyon, any areas that will be covered with artificial fill or will be compacted should be stripped of enough topsoil to provide an adequate volume for reclamation. Because of the long term of soil stockpiling, it is not worthwhile to separately stockpile the organic-rich surface (A horizons) and the underlying soil horizons. One stockpile can combine all horizons of all the hillslope soils (map units TrE and FaDE). If stockpiling of soils in the canyon bottom (map units BrCD, SiAB) is necessary, they should be stockpiled separately from the stony hillslope soils. The hillside soils have a low water erodibility (K factor, Table 4.6) which makes them ideal for

Table 4.6

SOIL ERODIBILITY

Soil Series (Map Unit Symbols)[a]	Depth (in.)	USLE Water[b] Erodibility Factor (K)	Wind Erodibility Group (WEG)
Brycan coarse variant (BrCD)	0- 8	0.25	5
	8-60+	0.20-0.29	3
CC soil (SiAB)	0-16	0.15-0.40	6
	16-42	0.30-0.39	5
	42-64+	0.38	5
Croydon[c] (CrE, RGF)	0-22	0.24	5
	22-48	0.32	6
Falcon (FaDE)	0- 7	0.10	3
	7-14	0.10	3
Silas (SiAB)	0-45	0.32-0.46	5
	45-61+	0.32-0.42	4L
Trag (TrE)	0-10	0.16	5
	10-45	0.16-0.19	6
	45-60+	0.19	6

[a]Map units in which the soil is a major component.

[b]Includes correction for coarse fragments (Wischmeier and Smith, 1978, p. 10).

[c]From SCS Soil Interpretations Record.

redressing steep slopes. In contrast, the soils of the canyon bottom are more erodible. The soils of the canyon bottom should be redressed on gentle slopes comparable to the ones on which they naturally occur. The topsoil stockpiles should be stabilized by mulch and vegetation, and be surrounded by a low ridge to prevent loss of eroded topsoil.

5.0 LAND USE

5.1 CAPABILITY AND CURRENT USE OF LAND

Current uses of the land are shown on a map (Figure 4) of the area at a scale of 1:6,000 (1" = 500'). Current land uses for each of the soil series, along with their capability classes for non-irrigated and irrigated use, potential natural forage production, and important tree species are presented in Table 5.1.

5.1.1 Grazing

Grazing within the project area occurs on irrigated pasture and unimproved range. The soils with the highest potential for the production of natural forage are the Croydon and Silas soils (Table 5.1).

Irrigated pasture on Silas, CC, and Brycan coarse variant soils occurs at the mouth of Winter Quarters Canyon. The hay is natural and unimproved and is harvested by grazing. The area is flood irrigated by blocking the flow in a ditch that runs parallel to the access road in Winter Quarters Canyon. The area is occasionally harrowed. About 100 cows with calves are run on an area of about 160 acres from May to October or November (Jensen, 1981).

The land in the permit area west of Section 5, T. 13 S., R. 7 E. and the hilly area in the NW quarter of Section 5 is used for sheep and cattle grazing, wildlife habitat, and watershed. The predominant soils are the Trag and Croydon soils. The area west of Section 5 is grazed from June through October (Allred, 1981). The area in Section 5 is grazed from May through October or November (Jensen, 1981).

5.1.2 The Potential for Cultivation and Prime Farmland Determination

Land-capability classes of the soils for non-irrigated management, and for irrigated management when applicable, are presented in Table 5.1. They show that the only soil that is at all suited for cultivation within the area to be disturbed is the Brycan coarse variant, 5 to 25 percent slopes. However, it occurs in areas too small to be cultivated and the uppermost slopes are too steep. All the other soils in the area to be disturbed are generally suitable only for grazing, wildlife habitat, and watershed.

A negative prime farmland determination has been made by Mr. T. B. Hutchings, the State Soil Scientist for the Soil Conservation Service in Utah (Attachment D). We concur with this finding. The factors limiting farming are steep slopes and stony soils on the hillsides in Winter

Table 5.1

PLANT PRODUCTION CAPABILITY
AND CURRENT USE OF SOILS

Soil Series (Map Unit Symbols)[a]	Slope Phase	Capability Class[b] Non-irrigated	Irrigated	Current Land Use	Potential Natural[c] Forage Production (lbs. dry wt./ac.) favorable/normal/ unfavorable years	Important Tree Species
Brycan coarse variant (BrCD)	5-25% slope	6E[d]	4E[d]	range, access road, irrigated pasture, wildlife habitat, watershed	(1500/1000/700)[e]	none
CC soil (SiAB)	all	7W	7W[f]	irrigated pasture, range, wildlife habitat, watershed, access road	NA	none
Croydon (CrE, RGF)	all	7W	---	wooded range, wildlife habitat, watershed	5300/3050/2000	aspen
Falcon (FaUE)	all	7E[f]	---	range, wildlife habitat, watershed	NA	none[f]
Silas (SiAB)	all	6W	5W[f]	irrigated pasture, range, wildlife habitat, watershed, access road	4600/3800/3000	none
Trag (TrE)	10+% slope	7E[f]	---	range, wildlife habitat, watershed, access road	2000/1600/1200	none

--- = not applicable
NA = no data available

[a] Map units in which the soil is a major component.
[b] Classes 1 through 4 are suitable for cultivation with class 1 having the least limitations for cultivation and 4 the most. Classes 5 through 8 are unsuitable for cultivation with increasing severity of limitations. Limitations primarily caused by wetness or erosion factors are denoted by W or E, respectively.
[c] Data are from SCS Soil Interpretation Records.
[d] Same as for Brycan series.
[e] Data is for Brycan series.
[f] Information is site specific and differs from SCS Soil Interpretation Records.

Quarters Canyon, and cold soil temperatures in the bottomlands of Winter Quarters Canyon.

5.1.3 Forestry

The north-, east-, and southeast-facing hillslopes in Winter Quarters Canyon and on the adjacent ridges are woodlands. The woodland is not being utilized for wood products (Allred, 1981). No woodland will be disturbed.

5.1.4 Transportation Routes

The unimproved dirt access road in Winter Quarters Canyon is not an important route. It is used only for access to the rangelands within Winter Quarters Canyon. A locked gate presently restricts access on the road.

5.1.5 Recreation

Recreation in Winter Quarters Canyon is limited by the restriction of access to the area by the private landowner. Recreational users of the area must walk or ride horses to get into the area. Activities include hunting for deer and elk, and trout fishing (Allred, 1981).

5.2 HISTORIC LAND USE

Winter Quarters Canyon was the site of 5 underground coal mines which operated over the period from 1878 to the 1930's. While the Winter Quarters Mines were active, a mining community existed in the canyon to the east of the proposed surface facilities area. Relic buildings and foundations still exist along the access road in the canyon in Section 6 and the eastern part of Section 1.

5.3 LOCAL LAND USE CLASSIFICATION

The entire project area lies within Carbon County's newly created CE-2, Critical Environmental Zone. These CE-2 lands cover certain Mountain riparian and other lands of environmental concern in the county. However, these lands are of less critical concern than the CE-1 lands and consequently do allow for certain levels of mining. Major underground mines, when approved by the county commission and in accordance with the applicable provisions of Chapter 5-4 of the Development Code of Carbon County, Utah, are allowed within this CE-2 zone.

6.0 REFERENCES

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ATTACHMENTS

ATTACHMENT A

Abbreviations for

Soil Descriptions

ABBREVIATIONS FOR SOIL DESCRIPTIONS

(Soil Conservation Service: National Soils Handbook Part II 407.1(a)(3)iii; 1960; and 1951, p. 139-140)

COLOR (Low, 1977)

black	bl.	dark	dk.	red	red
blue	blue	gray	gr.	variegated	varig.
brown	brn.	green	grn.	white	wh.
brownish gray	brn. gr., etc.	pink	pink	yellow	yel.
calcareous	calc.				

MOTTLING

Abundance:

few (<2% of surface)	f
common (2020% of surface)	c
many (>20% of surface)	m

Size:

fine (<5 mm)	1
medium (5-15 mm)	2
coarse (>15 mm)	3

Contrast (Variations of hue and chroma of matrix and mottles):

faint (closely related)	f
distinct (1-2 hues and several units in chroma and value)	d
prominent (several units in hue, value, and chroma)	p

TEXTURE

Modifier:

BY	Bouldery	CRC	Coarse cherty	PT	Peaty
BYV	Very bouldery	CRV	Very cherty	SH	Shaly
BYX	Extremely bouldery	FL	Flaggy	SHV	Very shaly
CB	Cobbly	FLV	Very flaggy	SR	Stratified
CBA	Angular cobbly	GR	Gravelly	ST	Stony
CBV	Very cobbly	GRC	Coarse gravelly	STV	Very stony
CN	Channery	GRF	Fine gravelly	STX	Extremely stony
CNV	Very channery	GRV	Very gravelly	SY	Slaty
CR	Cherty	MK	Mucky	SYV	Very slaty

Texture or terms used lieu of texture:

VCOS	Very coarse sand	SIL	Silt loam	GYP	Gypsiferous material
COS	Coarse sand	SI	Silt	HM	Hemic material
S	Sand	SCL	Sandy clay loam	ICE	Ice or frozen soil
FS	Fine sand	CL	Clay loam	IND	Indurated
VFS	Very fine sand	SICL	Clay loam	MARL	Marl
LCOS	Loamy coarse sand	SC	Sandy clay	MPT	Mucky-peat
LS	Loamy sand	SIC	Silty clay	MUCK	Muck
LFS	Loamy fine sand	C	Clay	PEAT	Peat
LVFS	Loamy very fine sand	CE	Coporgeneous earth	SG	Sand and Gravel
COSL	Coarse sandy loam	CEM	Cemented	SP	Sapric material
SL	Sandy loam	DE	Diatomaceous earth	UWB	Unweathered bedrock
FSL	Fine sandy loam	FB	Fibric material	VAR	Variable
VFSL	Very fine sandy loam	FRAG	Fragmental material	WB	Weathered bedrock
L	Loam	G	Gravel	CIND	Cinders
lt	Light	hv	Heavy	lt CL	Light clay loam, etc.

STRUCTURE

Grade:

structureless.....0
weak.....1
moderate.....2
strong.....3

Form or Type:

platy.....pl
prismatic.....pr
columnar.....cpr
blocky.....bk
angular blocky.....abk
subangular blocky....sbk
granular.....gr
crumb.....cr
single grain.....sg
massive.....m

Size (differs with kind of structure as follows):

Size class	Diameter of granules	Thickness of plates	Diameter of blocks	Diameter of prisms
vf very fine or very thin*	<1 mm	<1 mm	<5 mm	<10 mm
f fine or thin	1-2 mm	1-2 mm	5-10 mm	10-20 mm
m medium	2-5 mm	2-5 mm	10-20 mm	20-50 mm
c coarse or thick*	5-10 mm	5-10 mm	20-50 mm	50-100 mm
vc very coarse or very thick*	>10 mm	>10 mm	>50 mm	>100 mm

*Read "thin" and "thick" for platy instead of "fine" and "coarse."

CONSISTENCE

Wet soil:

nonsitcky.....so
slightly sticky.....ss
sticky.....s
very sticky.....vs
nonplastic.....po
slightly plastic.....ps
plastic.....p
very plastic.....vp

Moist soil:

loose.....l
very friable.....vfr
friable.....fr
firm.....fi
very firm.....vfi
extremely firm.....efi

Cementation:

weakly cemented.....cw
strongly cemented.....cs
indurated.....ci

Dry soil:

loose.....l
soft.....s
slightly hard.....sh
hard.....h
very hard.....vh
extremely hard.....eh

REACTION

Effervescence with HCl:

none.....eo
slight.....e
strong.....es
violent.....ev

BOUNDARY

Distinctness:

abrupt (<1" thick).....a
clear (1"-2½").....c
gradual (2½"-5").....g
diffuse (>5" thick).....d

Topography:

smooth (nearly a plane).....s
wavy (pockets, width > depth).....w
irregular (pockets, depth > width).....i
broken (discontinuous).....b

ROOTS

Abundance of roots by number and size

Code	Class	Very fine (1 mm)	Fine (1-2 mm)	Medium (2-5 mm)	Coarse (5-10 mm)
		Average number per square decimeter			
1	Few	<10	<10	<1	<1
2	Common	10 to 100	10 to 100	1 to 10	1 to 5
3	Many	≥100	≥100	≥10	≥5

Size:
very fine (<1 mm in diameter).....vf
fine (1-2 mm in diameter).....f
medium (2-5 mm in diameter).....m
coarse (>5 mm in diameter).....co

PORES

Abundance of pores by number and size

Code	Class	Very fine (0.1-0.5 mm)	Fine (0.5-2 mm)	Medium (2-5 mm)	Coarse (5-10 mm)
		Average number per square decimeter			
1	Few	<25	<10	<1	<1
2	Common	25 to 200	10 to 50	1 to 5	1 to 2.5
3	Many	≥200	≥50	≥5	≥2.5

Continuity:
discontinuous.....dis
constructed.....cons
continuous.....cont

Shape:
vesicular.....v
irregular or interstitial.....i
tubular.....t

Orientation:
vertical (within 45° of vertical).....ver
horizontal (within 45° of horizontal).....hor
random (neither vertical nor horizontal).....ran
oblique (near 45° to vertical or horizontal).....obl

CLAY FILMS

Frequency (% of ped faces and/or pores containing clay films:
very few (<5%).....vl
few (5-25%).....1
common (25-50%).....2
many (50-90%).....3
continuous (>90%).....4

Thickness:
thin.....n
moderately thick.....mk
thick.....k

Morphology:
clay films occur on faces of peds.....pf
clay films line tubular or interstitial pores.....po
oriented clay occurs as bridges holding mineral grains together.....br
colloid stains mineral grains.....co

ATTACHMENT B

Descriptions of Sampled Soil Profiles
of CC Soil, Silas Series, Fill
Overlying CC Soil, Trag Series,
Fill, and Brycan Coarse Variant

SOIL DESCRIPTION
Profile 1

Soil type: CC loam | Job: UCO | File No.: UCO

Classification: Fine-loamy, mixed, Cumulic Cryaquoll | Date: 1-9-81 | Stop No.: 1

Area: Railroad : 1,170 feet north of mileage 15 marker, west of track

Legal Description: T. 12 S. R. 7 E. Section 32, 1700' S, 1540' W, NE corner

Vegetation: grasses, sedges and sphagnum moss; adjacent land is irrigated pasture

Parent Material: alluvium derived from sandstone and shale

Physiography: swale on valley floor

Relief: nearly level concave slope

Drainage: poor

Elevation: 7,645'

Gr. Water: below 20" at field capacity,

Slope: 1%

Moisture: moist throughout 0-10" frozen

Aspect: ----

Erosion Condition: none

Permeability: moderately slow

Current Use: railroad right of way

Climate: cryic, aquic

Salt or Alkali: none

Surface Stoniness: none

% Coarse fragments*: 0

% Clay*: 20

% Coarser than V.F.S.*: 35

*Control section average: Field estimate of

Additional Notes:

0-7" - abundant coal chips

* - described and sampled by auger, not possible to describe boundary; structure is a crude estimate

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
A 11	0-7	10 YR 4/2	10 YR 3/2	flp 7.5 YR 5/8	L	2f gr*	sh	vfr	ss ps	6.6 ---	*	2m, f,vf		--	0	0	0	0	S
A 12	7-16	10 YR 4/2	10 YR 3/2	clp 7.5 YR 5/8	L	1m & c gr	sh	vfr	ss ps	6.7 ---	---	2m,f 3vf		--	0	0	0	0	S
A 13	16-29	10 YR 4/2	10 YR 3/2	clp 7.5 YR 5/8	L	1c gr	sh	vfr	ss ps	7.3 ---	---	2m,f 3vf		--	0	0	0	0	S
C 1	29-42	2.5 Y 4/2	2.5 Y 3/2	clp 2.5 Y 6/2	L	m	h	vfr	ss p	7.2, e pockets	in ---	2vf 1f		--	0	0	0	0	S
C 2 co	42-64	2.5 Y 5/2	2.5 Y 3/2	clp 2.5 Y 6/2	L	m	sh	vfr	ss p	7.7 es	---	1vf		--	0	0	0	0	S

SOIL DESCRIPTION
Profile 2

Soil type: Silas loam | Job: UCO | File No.: UCO

Classification: fine-loamy, mixed, Cumulic Cryoboroll | Date: 1-9-81 | Stop No.: 2

Area: Railroad [illegible]; 660' N mile 15 marker, west of track

Legal Description: T. 12 S R. 7 E Section 32, 2200' S & 1500' W of NE corner

Vegetation: Grasses; adjacent land is used as irrigated pasture.

Parent Material: alluvium derived from sandstone and shale

Physiography: slight rise on valley floor

Relief: nearly level, convex slope

Drainage: somewhat poor

Elevation: 7,650'

Gr. Water: probably at 5 - 10'

Slope: 1%

Moisture: very moist

Aspect: ---

Erosion Condition: none

Permeability: moderately slow

Current Use: railroad right of way

Climate: cryic, ustic

Salt or Alkali: none

Surface Stoniness: none

% Coarse Fragments*: 0

% Clay*: 25

% Coarser than V.F.S.*: 35

*Control section average: Field estimate of

Additional Notes:

*described and sampled by auger, not possible to describe boundary; structure is a crude estimate

55-61" contains fine pockets of lime

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
A 11	0-16	10 YR 4/2	10 YR 3/2	f1f	L	1f gr*	sh	vfr	ss ps	7.3 ---	*	1f		--	0	0	0	0	S
A 12	16-24	10 YR 4/3	10 YR 3/3	f1f	L	1f abk	sh	fr	ss ps	7.4 ---	--	1f, m		--	0	0	0	0	S
A 11b	24-35	10 YR 4/2	10 YR 3/2	--	L	1f abk	h	fr	ss ps	7.4 ---	--	2vf		--	0	0	0	0	S
A 12b	35-45	10 YR 5/3	10 YR 3/3	f1d gray	L	1f abk	sh	fr	ss ps	7.6 ---	--	1vf, f,m		--	0	0	0	0	S
C 1cnb	45-55	10 YR 6/2	10 YR 5/3	f1d gray	SL	m	sh	fr	ss ps	7.9 es	--	1vf, f,m		--	0	0	0	0	S
C 2cnb	55-61	2.5 Y 5/2	10 YR 4/3	c 1&2 p orange	CL	1m abk	h	fr	s p	7.9 es	--	none		--	5	0	0	0	S

SOIL DESCRIPTION
Profile 3

Soil type: Fill overlying CC soil
Job: UCO
File No.: UCO

Classification: 35+" fine-loamy, mixed, Cumulic Cryaquoll
Date: 1-10-81
Stop No.: 3

Area: Facilities area, flat just west of fan and below road

Legal Description: T. 13 S R. 6 E Section 1, 3350' N and 1410' W of SE corner

Vegetation: barren; similar areas have grasses

Parent Material: coal debris and soil mix over alluvium derived from sandstone & shale

Physiography: alluvial bottomland

Relief: nearly level
Simple slope

Drainage: poor

Elevation: 8010'

Gr. Water: probably @ 10'

Slope: 2%

Moisture: moist throughout

Aspect: --

Erosion Condition: --

Permeability: moderately slow

Current Use

Climate: cryic, aquic

Salt or Alkali: none

Surface Stoniness: --

% Coarse Fragments*: 2

% Clay*: 28

% Coarser than V.F.S.*: 20

*Control section average: Field estimate of for soil below 35"

Additional Notes:

This site appeared to have been recently bulldozed over with debris.

0-14" Entirely coal waste smaller than 1"

14-20" Mix of sandy gravel coal waste and soil-gravelly loamy sand

20-29" Mix of soil and coal, including artifacts; has orange iron stains

29-35" Soil fill

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
Fill 1	0-14	10 YR 2/1	10 YR 2/1		SG	sg	--	--	so po	6.9 e	aw	none		--	-	-	-	-	S
Fill 2	14-20	10 YR 2/1, 3/2	Varig. 10 YR 2/1, 3/2		SG	sg	--	--	so po	6.9 es	aw	none		--	-	-	-	-	
Fill 3	20-29	10 YR 4/1	10 YR 3/1*		GR lt. SCL	2f pl	sh	fr	ss ps	7.3 e	aw	none		--	15	0	0	0	S
Fill 4	29-35	10 YR 4/2	Varig. 10YR 3/4&4/3		GR SCL	2f pl	sh	fr	ss ps	7.3 -	as	none		--	20	0	0	0	
A11 b[1]	35-35½	10 YR 3/2	10 YR 2/2		SIL	1c sbk	sh	fr	ss ps	7.2 -	as	2f, vf		--	0	0	0	0	S
A12 b[1]	35½-45	10 YR 4/2	10 YR 3/2	clp orange	light CL	1c sbk	sh	fr	ss ps	7.2 -	aw	1f, vf		--	0	0	0	0	
A11 b[2]	45-46	10 YR 4/1	10 YR 3/1	clp orange	heavy L	1c sbk	sh	fr	ss ps	7.4 -	aw	1m, f vf		--	0	0	0	0	S
A12 b[2]	46-57	10 YR 4/2	Varig. 10 YR 3/2	m2f orange	heavy L	m	so sh	fr	ss ps	7.4 -	gw	1m, f vf		--	2	0	0	0	
A13 b[2]	57-68	10 YR 4/1	10 YR 3/1	m1f orange	light CL	m	slrh	fr	ss ps	7.3 -	gw	1f, vf		--	5	0	0	0	S
C b[2]	68-75	10 YR 4/5/2	10 YR Varig. 4/2	clp orange	stratif. SL & CL	m	sh	fr	ss ps	7.2 -	-	none		--	0	0	0	0	S

SOIL DESCRIPTION
Profile 4

Soil type	Trag flaggy loam	Job: UCO	File No.: UCO
Classification	fine-loamy, mixed, Typic Argiboroll	Date: 1-10-81	Stop No.: 4
Area	Facilities area; roadcut on hillside about 200' west of fan at proposed facilities area		Additional Notes:
Legal Description	T. 13 S R. 6 E Section 1, 3390' N and 1570' W of SE corner		45-60" - Common fine filaments of lime
Vegetation	big sage, rabbitbrush and bitterbrush		
Parent Material	colluvium and residuum derived from sandstone and shale	Current Use range	[a] Ped faces
Physiography	backslope	Climate frigid, ustic	[b] Ped interior
Relief	very steep simple slope	Drainage well	Salt or Alkali none
Elevation	8050'	Gr. Water none	Surface Stoniness class 3 — Boulders sometimes larger than 5' across
Slope	63%	Moisture moist	% Coarse Fragments* 25
Aspect	south		% Clay* 32
Erosion Condition	slight		% Coarser than V.F.S.* 25
Permeability	moderately slow		Field estimate of *Control section average

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
A 1	0-10	10 YR 4/3	10 YR 3/2	--	FL-L	3 f&m gr	sh	vfr	ss ps	7.2 -	cw	2vf, f,m		none	10	10	6	2	S
B 21t	10-19	10 YR 5/3	10 YR 4/3	--	GR-CL	3 f & vf abk	sh	vfr	ss ps	7.0 -	gw	2f, vf,m		2n	12	8	6	2	S
B 22t	19-45	10 YR 5/3[a] 6/3[b]	10 YR 3/4[a] 4/4[b]	--	FL-CL	2m abk	h	fr	s p	7.4 -	gw	1vf, f,m		3n	12	12	6	2	S
B3ca	45-60	10 YR 6/3	10 YR 5/4	--	FL -lt. CL	2m abk	h	fr	s ps	7.7 es	di	1,vf f, m		1n	12	12	6	2	S
Cca*	90-BD	2.5 Y 7/4	2.5 Y 5/4	--	SCL	1m abk	sh	fr	ss ps	8.0 es	--	none		none	12	12	6	2	S

* sample taken for overburden study

SOIL DESCRIPTION
Profile 5

Soil Type: Fill | Job: UCO | File No.: UCO

Classification: -- | Date: 1-10-81 | Stop No.: 5

Area: Facilities area; just east of alluvial fan

Legal Description: T. 13 S R. 6 E Section 1, 810' W and 3340' N, SE corner

Vegetation: big sage, rabbitbrush

Parent Material: debris and soil | Current Use: range

Physiography: low alluvial terrace | Climate: frigid, ustic

Relief: gentle, simple slope | Drainage: moderately well | Salt or Alkali: none

Elevation: 7990' | Gr. Water: about 10' | Surface Stoniness: (snow cover)

Slope: 5% | Moisture: moist throughout | % Coarse Fragments*: N/A

Aspect: east | % Clay*: N/A

Erosion Condition: -- | % Coarser than V.F.S.*: N/A

Permeability: moderately slow | Field estimate of

*Control section average

Additional Notes:

0-13" Contains 50% coal fragments; also nails, ceramics, glass

13-30" as above but 75% coal fragments

30-35" as above; 50% coal fragments

35-62" few coal fragments up to 1/2"; mostly fine earth; no artifacts

62-66" 50% coal fragments up to 1"; wood fragments present

66-75" 2% coal fragments up to 1/4"

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
Fill 1	0-13	10 YR 3/1	10 YR 3/1	--	GR-L	lm gr	sh&lo	vfr	ss ps	7.0 e	cs	2vf		--	15	2	0	0	S
Fill 2	13-30	10 YR 2/1	10 YR 2/1	--	L	lm sbk	sh&lo	vfr	ss ps	7.3 es	as	1vf, f,m		--	5	2	0	0	S
Fill 3	30-35	10 YR 3/1	10 YR 3/1	--	L	lm sbk	sh&lo	vfr	ss ps	7.3 es	cs	1vf		--	5	2	0	0	
Fill 4	35-62	10 YR 5/2	10 YR 4/2	--	light CL	lm sbk	sh	fi	s p	7.3 e	cs	1f, m		--	5	2	1	0	S
Fill 5	62-66	10 YR 3/1	10 YR 3/1	--	GR-L	lm sbk	lo	vfr	ss ps	7.3 -	cs	2f		--	20	0	0	0	
C b	66-75	10 YR 4/2	10 YR 3/2	--	GR-L	m	sh	vfr	ss ps	7.3 -	--	none		--	15	0	0	0	S

N/A - Not Applicable

SOIL DESCRIPTION
Profile 6

Soil type: Brycan loam, coarse variant | Job: UCO | File No.: UCO

Classification: coarse-loamy, mixed Cumulic Haploboroll | Date: 1-11-81 | Stop No.: 6

Area: Just above access road in canyon; about 400' W of gate, about 100' N of road

Legal Description: T. 13 S R. 7 E Section 6, 2600' W and 3390' N, SE corner

Vegetation: big sagebrush and rabbitbrush

Parent Material: alluvium derived from sandstone and shale

Physiography: alluvial fan

Relief: simple, mod. steep slope

Drainage: well

Elevation: 7830'

Gr. Water: none

Slope: 20%

Moisture: slightly moist below 8"; moist and frozen above

Aspect: south

Erosion Condition: slight

Permeability: moderate

Current Use: range

Climate: frigid, ustic

Salt or Alkali: none

Surface Stoniness: class 2

% Coarse Fragments*: 10

% Clay*: 24

% Coarser than V.F.S.*: 25

*Control section average

Field estimate of

Additional Notes:

** - Augered 28 to 60 inches, not possible to describe boundary; structure is crudely estimated

Horizon	Inch Depth	Color Dry	Color Moist	Mottles	Texture	Structure	Consistence Dry	Consistence Moist	Consistence Wet	pH Reaction	Boundary	Roots	Pores	Clay Films	% Gr.	% Cob.	% St.	% Bld.	Sample
A 11	0-3	10 YR 5/2	10 YR 3/2	--	L	lvf sbk	so	lo	ss ps	7.4 e	cs	lf		--	3	2	0	0	S
A 3	3-8	10 YR 5/3	10 YR 3/3	--	GR-L	lm sbk	sh	vfr	ss ps	7.4 e	gs	2f, lm		--	15	0	0	0	
B 2	8-24	10 YR 5/3	10 YR 3/3	--	SL	2m sbk	sh	vfr	ss ps	7.5 -	cs	lvf, f		--	8	2	0	0	S
C 1	24-38	10 YR 4/3	10 YR 3/2	--	SL	m	so	lo	ss ps	7.7 -	**	none		--	10	0	0	0	S
C 2	38-60	10 YR 5/3	10 YR 3/2	--	SL	m**	so	lo	ss ps	8.0 e	--	none		--	10	0	0	0	S

ATTACHMENT C

SCS Official Soil Series Descriptions
of Croydon, Falcon and Kunz Series

Established Series
Rev. EJ/JAC/AJE
11/74

CROYDON SERIES

The Croydon series consists of deep, well drained soils that formed in material weathered from sandstone. These soils are on north-facing mountain slopes. The mean annual precipitation is about 30 inches and the mean annual air temperature is about 38°F.

Soil Family: Fine-loamy, mixed Argic Cryoborolls.

Typical Pedon: Croydon loam, woodland. (Colors are for moist soil unless otherwise noted.)

O1—1 inch to 0, leaves and other plant material. (1 to 4 inches thick)

A11—0 to 4 inches, very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; weak thick platy structure that parts to moderate fine granular; soft, friable, nonsticky and slightly plastic; many very fine, fine and coarse roots; slightly acid (pH 6.5); clear smooth boundary. (3 to 16 inches thick)

A12—4 to 16 inches, very dark brown (10YR 2/2) loam, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; soft, very friable, nonsticky and slightly plastic; many very fine through coarse roots; slightly acid (pH 6.5); abrupt broken boundary. (0 to 13 inches thick)

A2—16 to 22 inches, brown (10YR 4/3) heavy loam, pale brown (10YR 6/3) dry; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine through coarse roots; common fine pores; 20 percent gravel; 35 percent of this horizon is animal burrow material from A12 horizon above; slightly acid (pH 6.4); clear wavy boundary. (3 to 11 inches thick)

B21t—22 to 28 inches, light olive brown (2.5Y 5/4) silty clay loam, pale olive (5Y 6/3) dry; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine, fine and medium roots; common fine pores; common thin and many moderately thick clay films on faces of peds; small pockets of A12 horizon from animal burrows; slightly acid (pH 6.2); clear smooth boundary. (3 to 10 inches thick)

B22t—28 to 40 inches, light olive brown (2.5Y 5/4) silty clay loam, pale olive (5Y 6/3) dry; moderate coarse subangular blocky structure that parts to moderate fine subangular blocky; very hard, firm, sticky and plastic; few very fine and fine roots; common fine pores; continuous thin clay films on faces of peds; slightly acid (pH 6.2); clear smooth boundary. (6 to 31 inches thick)

C—40 to 48 inches, light olive brown (2.5Y 5/4) heavy silt loam, pale olive (5Y 6/3) dry; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; few fine roots; slightly acid (pH 6.2); abrupt smooth boundary. (0 to 22 inches thick)

R—48 inches, weathered sandstone bedrock.

Type Location: Morgan County, Utah; about 8.5 miles east, and 4 miles north of Croydon, Utah; 1,475 feet south and 200 feet east of the NW corner of sec. 34, T.5N., R.5E.

Range in Characteristics: The mollic epipedon is 11 to 19 inches thick. The combined thickness of the A1, A2 and B2t horizons ranges from 39 to 53 inches. Soft weathered sandstone occurs at depths of 45 to more than 60 inches. The mean annual soil temperature at depth of 20 inches ranges from 39° to 42°F. The mean summer soil temperature ranges from 56° to 59°F. The soils are usually moist but are dry for 30 to 45 consecutive days during late summer. Rock fragments consist of rounded pebbles and cobbles, and range from 0 to 20 percent in the A1 horizon, 0 to 30 percent in the A2 horizon, 0 to 20 percent in the B2t horizon and 0 to 20 percent in the C horizon.

The A1 horizon has value of 3 through 5 dry, 2 or 3 moist, and chroma of 2 or 3 dry. It is loam or silt loam, medium acid to slightly acid, and is 11 to 19 inches thick.

The A2 horizon has hue of 10YR or 2.5Y, value of 5 through 8 dry, 4 through 6 moist and chroma of 2 through 4 dry and moist. It ranges from loam or cobbly loam to cobbly sandy loam. This horizon is slightly or medium acid and is 3 to 11 inches thick.

The B2t horizon has dominant hue of 2.5Y or 5Y (10YR in parts of some pedons), value of 5 through 7 dry and 4 or 5 moist, and chroma of 2 through 4 dry and moist. It ranges from silty clay loam to clay loam. This horizon has weak to moderate, fine to coarse subangular blocky structure. Clay films are common to continuous thin and few to many moderately thick on faces of peds. The B2t horizon is slightly or medium acid, and is 15 to 38 inches thick.

The C horizon has dominant hue of 2.5Y or 5Y (10YR in parts of some pedons), value of 5 through 7 dry, 4 or 5 moist, and chroma of 2 through 4 dry and moist. It ranges from silt loam to loam, gravelly loam, clay loam or silty clay loam. This horizon ranges from noncalcareous to moderately calcareous and is medium acid through neutral.

Competing Series: These are the Amsden, Archabal, Dra, Gelkie, Hourglass, Kezar, Kimmons, Leavitt, Lucky, Lymanson, Lyonman, Michelson, Miracle, Monida, Morset, Mult, Newlands, Oro Fino, Passcreek, Philipsburg, Primeaux, Rammel, Sponseller, Tingey, Tripit, Troutdale, Wellsville, Woosley and Youga series. All of these soils lack A2 horizons. Amsden, Dra, Gelkie, Kimmons, Leavitt, Lymanson, Michelson, Monida, Morset, Oro Fino, Passcreek, Philipsburg, Rammel, Tingey, Wellsville and Woosley soils have horizons of secondary calcium carbonate accumulation. Archabal soils are strongly acid. Hourglass soils have 20 to 35 percent rock fragments in the B2t horizon. Kezar, Kimmons, Lucky, Lymanson, Miracle, Mult, Newlands, Passcreek, Primeaux, Rammel, Tripit, Troutdale, and Woosley soils are 20 to 40 inches deep over bedrock. Lyonman soils have high chroma iron stains in the lower part of the B and upper C horizons and dominant hues of 10YR or redder. Newlands soils have hue of 10YR or redder in all parts of the B2t horizon. Sponseller soils have hue of 5YR or 2.5YR. Youga soils have A1 horizons 5 to 10 inches thick.

Geographic Setting: Croydon soils are at elevations of 6,400 to 8,300 feet. They occur on north-facing mountain slopes. Slopes range from 30 to 60 percent. These soils formed in residuum and local alluvium weathered from sandstone. The climate is humid and the average annual precipitation ranges from 25 to 35 inches. The mean annual temperature is 37° to 40°F. The mean summer temperature is 53° to 56°F., and the frost-free period ranges from 65 to 75 days.

Associated Soils: These are the Hades, Isbell, Kilfoil, Lucky Star, and Scave soils. Hades soils have mollic epipedons more than 20 inches thick and lack A2 horizons. Isbell soils have summer soil temperature greater than 59°F. and lack an A2 horizon. Kilfoil soils lack a mollic epipedon and are 20 to 40 inches deep to bedrock. Lucky Star and Scave soils have more than 35 percent rock fragments in the control section and have hue of 7.5YR, 5YR or 2.5YR.

Drainage and Permeability: Well drained; slow runoff; moderately slow permeability.

Use and Vegetation: These soils are used for watershed, range, wildlife habitat and timber production. The present native vegetation is aspen, white fir, Douglas-fir, snowberry, mountain bromegrass, ninebark, blue wildrye, peavine, sedges and willows.

Distribution and Extent: Northern Utah. This series is inextensive.

Series Established: Morgan Area, Morgan County, Utah, 1974.

National Cooperative Soil Survey
U. S. A.

Established Series
Rev. RHM
4/74

FALCON SERIES

The Falcon series is a member of the loamy, mixed family of Lithic Haploborolls. Falcon soils typically have dark grayish brown very friable, granular A horizons, and light gray, gravelly coarse sandy loam, neutral C horizons over hard arkosic conglomerate at depth of about 14 inches.

Typifying Pedon: Falcon coarse sandy loam - open timber
(Colors are for dry soil unless otherwise noted.)

A1 0-7"—Dark grayish brown (10YR 4/2) coarse sandy loam; very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable; 10 percent gravel; neutral; clear smooth boundary. (5 to 10 inches thick)

C 7-14"—Light gray (10YR 7/2) gravelly coarse sandy loam; grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; extremely hard, very friable; 20 percent fine and very fine angular granite gravel; neutral; abrupt smooth boundary.

R 14-20"—Hard arkosic sandstone and conglomerate.

Type Location: Douglas County, Colorado; on the east side of Colorado State Highway 83, 500 feet north of the southwest corner of sec. 35, T.10S., R.66W.

Range in Characteristics: Base saturation typically is more than 80 percent but ranges from 60 to 100 percent. C horizons typically occur below the A horizon but in some pedons the A horizon rests on the R layer. Depth to the lithic contact ranges from 10 to 20 inches. The control section is usually gravelly coarse sandy loam, and has 5 to 18 percent clay, 5 to 35 percent silt, and 50 to 80 percent sand with more than 35 percent being fine or coarser sand. A large proportion of the sand fraction is medium, coarse, and very coarse angular sand which has a high percentage of flat bearing surfaces between sand grains. Rock fragments range from 0 to 35 percent and are mainly less than 3 inches in diameter but range from 1/8 to 10 inches in diameter. The solum and C horizons range from slightly acid to mildly alkaline. The mean annual soil temperature is 45°F., and the mean summer soil temperature is 62°F. Mean winter soil temperature is warmer than 32°F. and the soils are not continually frozen during the winter. The A horizon in most pedons has hue of 2.5Y through 7.5YR, value of 4 or 5 dry, 2 or 3 moist, and chroma of 1 through 3. The C horizon normally has hue of 2.5Y through 7.5YR. Subhorizons redder than 7.5YR occur in some pedons.

Competing Series and their Differentiae: These are the Corpening, Goldfield, Kloten, and Namur series. Corpening soils are calcareous, and have continuous horizons of secondary calcium carbonate accumulation. Goldfield soils are medium to moderately fine textured. Kloten soils are medium to moderately fine textured, have minor amounts of medium, coarse, and very coarse angular sand, and are frozen during most of the winter. Namur soils are less than 12 inches to bedrock, have medium to moderately fine texture, and have a high bulk calcium carbonate equivalent including coarse fragments of dolomite.

Setting: Falcon soils are on moderate to steeply sloping upland ridges and hills generally at the crests and shoulders of the highest parts of the landscape. Slope gradients range from 3 to 40 or more percent. The soils formed in materials weathered residually from the Dawson and similar arkose sedimentary beds overlying strata of hard sandstone and conglomerate. At the type location the average annual precipitation is 17 inches with peak periods of precipitation in the spring and summer.

Principal Associated Soils: These are the Kettle and Pring soils. Kettle soils have ochric epipedons and albic horizons. Pring soils lack bedrock above depth of 40 inches.

Drainage and Permeability: Well to somewhat excessively drained; medium runoff; rapid permeability above the bedrock.

Use and Vegetation: These soils are used primarily as native pastureland. In some localities they support stands of ponderosa pine of some importance for forestry. Native vegetation is primarily thin stands of ponderosa pine, Gamble oak, mountain-mahogany, and scattered grasses.

Distribution and Extent: The Black Forest areas of east-central Colorado. The series is of moderate extent.

Series Established: Cherry Creek Soil Conservation District, El Paso and Douglas Counties, Colorado, 1946.

National Cooperative Soil Survey
U. S. A.

Established Series
Rev. KMD/AJE
6/80

KUNZ SERIES

The Kunz series consists of deep, well drained soils that formed in material weathered from sandstone. Kunz soils are on mountain slopes and have slopes of 8 to 40 percent. The average annual precipitation is about 17 inches and the mean annual temperature is about 45° F.

Taxonomic Class: Fine-loamy, mixed Mollic Eutroboralfs.

Typical Pedon: Kunz cobbly loam - rangeland. (Colors are for dry soil unless otherwise noted.)

O1--1 inch to 0; decaying leaves.

A1--0 to 1 inch; dark brown (10YR 3/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak very f granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; f medium, common fine and very fine intersitital pores; 25 percent cobbles; mildly alkaline (pH 7.4); abrupt smo boundary. (1 to 4 inches thick)

B1--1 to 3 inches; dark brown (10YR 3/3) cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; few medium and fine, and common very fine tubular pores; 25 percent cobbles; mildly alkaline 7.6); abrupt smooth boundary. (0 to 3 inches thick)

B21t--3 to 17 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismati structure parting to strong medium, fine and very fine subangular blocky; very hard, firm, sticky and plastic; few coarse and medium, common fine and very fine tubular pores; many moderately thick clay films on faces and very fine tubular pores; many moderately thick clay films on faces of peds and in pores; 5 percent cobbles; mildly alkaline pH 7.8); gradual smooth boundary. (10 to 20 inches thick)

B22t--17 to 25 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure parting to strong coarse subangular blocky; very hard, firm, sticky and plastic; few coarse, fine and very fine roots; few medium and fine, and common very fine pores; common moderat thick clay films on faces of peds and in pores; 5 percent cobbles; mildly alkaline (pH 7.6); gradual smooth boundary. (7 to 19 inches thick)

B23t--25 to 37 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate coarse prismatic structure parting to strong coarse subangular blocky; very hard, firm, sticky and plastic; few fine very fine roots; common fine and very fine tubular pores; many moderately thick clay films on faces of peds an in pores; 5 percent cobbles and 5 percent pebbles; mildly alkaline (pH 7.6); gradual smooth boundary. (11 to inches thick)

B31--37 to 47 inches; brown (7.5YR 5/4) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; few medium and fine, common very fine tubular pores; few thin clay films on faces of peds and in pores; mildly alkaline (pH 7.6); clear smooth boundary. (0 to 10 inches thick)

B32--47 to 60 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few coarse and medium, common fine and very fine tubular pores; neutral (pH 7.2).

Type Location: Washington County, Utah; about one mile east of Thorley Point in NE ¼ of section 9, T.39S., R.[illegible].

Range in Characteristics: The combined thickness of the A1, B1, B2t and B3 horizons ranges from 37 to 60 inch or more. The solum is mainly noncalcareous, but the B3 and C horizons where observed range from noncalcareous mocreately calcareous. The mean annual soil temperatuer at a depth of 20 inches ranges from 44° to 47° F. Th mean summer soil temperature ranges from 59° to 62° F. The soils are usually moist during the period the soil temperature is above 41° F. They are dry for 60 to 75 days during the 120 days following the winter solstice.

The A1 horizon has hue of 10YR, 7.5YR or 5YR, value of 3 through 5 dry, 2 or 3 moist, chroma of 2 or 3 dry and through 3 moist. It ranges from cobbly loam to fine sandy loam and has 0 to 25 percent rock fragments. This horizon is neutral or mildly alkaline.

The B2t horizon has hue of 10YR 7.5YR or 5YR, value of 4 through 6 dry, 3 through 5 moist, chroma of 3 through dry and moist. It has 20 to 35 percent clay. Structure ranges from moderate to strong, medium and coarse prismatic and fine to coarse subangular blocky. Rock fragments range from 0 to 15 percent. This horizon is neutral or mildly alkaline.

Competing Series: These are the Hogg, Maitland and Wankon series. Hogg soils have a clay B2t horizon. Maitland soils are mainly medium to strongly acid. Wankon soils have free carbonates at a depth of 18 to 40 inches.

Geographic Setting: Kunz soils are on mountain slopes at elevations of 6,000 to 8,000 feet. Slopes range from 8 to 40 percent. These soils formed in residuum and colluvium weathered from sandstone, shale and limestone. The climate is moist subhumid and the average annual precipitation is 16 to 18 inches. The mean annual temperature is 42° to 45° F and the mean summer temperature is 60° to 63° F. The frost-free period ranges from 90 to 110 days.

Geographically Associated Soils: These are the Detra soils. Detra soils have a mollic epipedon more than 16 inches thick.

Drainage and Permeability: Well drained; medium runoff; moderately slow permeability.

Use and Vegetation: These soils are used for rangeland and wildlife habitat. Present native vegetation is Gambel oak, serviceberry, snowberry, Oregon grape, wild rose, lupine and tall native bluegrass.

Distribution and Extent: Southern Utah. These soils are of small extent.

Series Established: Canyonlands Area, San Juan Co. Utah, 1980.

National Cooperative Soil Survey

U. S. A.

ATTACHMENT D

Letter of Negative Prime Farmland Determination

United States Department of Agriculture
Soil Conservation Service
4012 Federal Building
125 South State Street
Salt Lake City, UT 84138

RECEIVED
MAR 26 1981
UCO, INC.

March 25, 1981

J. Chris Carter
Manager-Environmental Affairs
UCO Incorporated
1580 Lincoln - Suite 530
Denver, Colorado 80203

Dear Mr. Carter:

I apologize for the delay in answering your inquiry. We have preliminary field soil survey data in this area. This location is transitional from the standpoint of temperature, in meeting prime farmland standards.

After considerable study we have considered the area is not prime farmland because of the cold temperatures. The soils classify in the Cryic temperature regime.

The narrow strip extending to the northeast traverses an alluvial valley.

The soils on the traverse are very high in carbonate due to deposition of materials from springs and have low capability in production of any crops except some water loving plants.

T. B. HUTCHINGS
State Soil Scientist

SKYLINE MINE AREA
AERIAL PHOTOGRAPHS
U 9153, 10-1-91

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WILDLIFE AND THREATENED AND ENDANGERED SPECIES

Winter Quarters Canyon
Data Adequacy

September 1992

WILDLIFE AND THREATENED AND ENDANGERED SPECIES APPENDICES

APPENDIX E
WILDLIFE AND THREATENED AND ENDANGERED SPECIES

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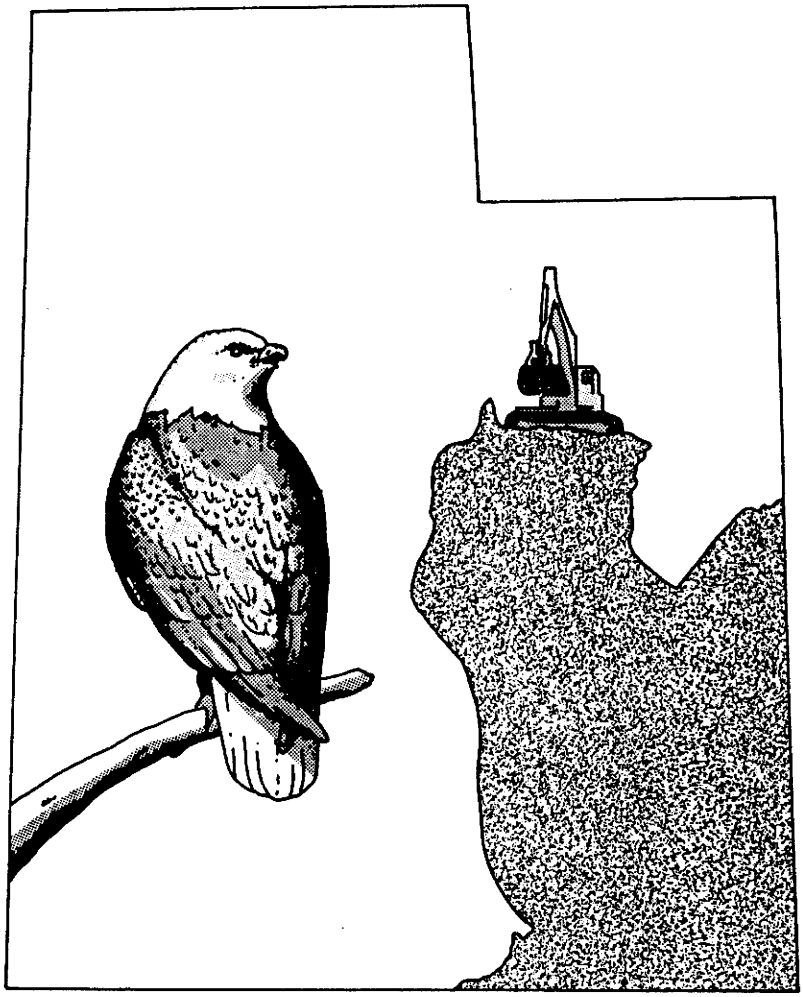
Winter Quarters Canyon
Data Adequacy

October 1992

FAUNA OF SOUTHEASTERN UTAH
UTAH DIVISION OF WILDLIFE RESOURCES

Fauna of Southeastern Utah
and
Life Requisites Regarding
their
Ecosystems



Publication No. 90-11

Utah Division of Wildlife Resources
Department of Natural Resources

FAUNA OF SOUTHEASTERN UTAH

AND

LIFE REQUISITES REGARDING THEIR ECOSYSTEMS

LARRY B. DALTON

JENNIFER S. PRICE

LAURA A. ROMIN

PUBLICATION NO. 90-11

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Utah Department of Natural Resources

Division of Wildlife Resources

1596 West North Temple

Salt Lake City, Utah 84116

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PREFACE

This publication was prepared with an intent to assist professional and lay land-use planners. It serves as a quick and simple method for assessing the likely inhabitation of vertebrate wildlife for a project area. The assessment would identify wildlife inhabitation by ecological association in the myriad of ecosystems within southeastern Utah. Without question, professional ecologists, educators, and wildlife enthusiasts will benefit from the information contained herein. This work supersedes Utah Division of Wildlife Resources Publication No. 78-16, "Vertebrate Species of Southeastern Utah."

Endorsement of this publication has been given by Utah's Divisions of Oil, Gas, and Mining; State Lands and Forestry; and Wildlife Resources, along with the U.S. Fish and Wildlife Service; U.S. Forest Service; and Bureau of Land Management. Each agency recognizes that although the data contained in this document represents an exhaustive effort, it should not be considered as final. Each and every day, wildlife ecologists gain a little more understanding for the complexities of the natural systems we struggle to manage. Collectively, all ecologists who have ever worked in southeastern Utah, have contributed in some way to this data. There is no doubt that future generations of ecologists will continue to add to this wealth of information.

A multitude of agencies have contributed information about wildlife species and their life requisites along with biological value of ecosystems within southeastern Utah. U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, Bureau of Reclamation, Soil Conservation Service, U.S. Forest Service, and Navajo Indian Nation biologists gratefully provided information concerning local sightings and distribution of animals. The ecological staff at the University of Utah, Brigham Young University, and

Utah State University were extremely helpful, also. Within Utah's Department of Natural Resources, wildlife conservation officers, biologists, and state park rangers provided valuable information on wildlife species within their areas of expertise.

Special thanks are extended to Utah Division of Wildlife Resources' personnel who assisted with cost accounting, review, and preparation of this document. The clerical personnel in the Southeastern Region and the Salt Lake City office made compiling of the data a reality. Artwork for the cover was done by Terry Howick and all other artwork was done by Johanna Felice.

Funding for publication was provided by the coal mine operators who have mining interests in southeastern Utah. Andalex, Beaver Creek Coal Company, Castlegate Coal, Coastal States Energy Company (Southern Utah Fuel Company and Utah Fuel Company), Consolidation Coal Mine, Co-op Mining Company, Cyprus Plateau Mining Company, Energy West Mining Company, Genwall Mining Company, Intermountain Power Association, Sunnyside Coal Mines, Soldier Creek Coal Company, U.S. Fuel Corporation, and Valley Camp of Utah, Inc., each generously donated funds to ensure publication and wide dispersement of this document.

L.B.D.
J.S.P.
L.A.R.

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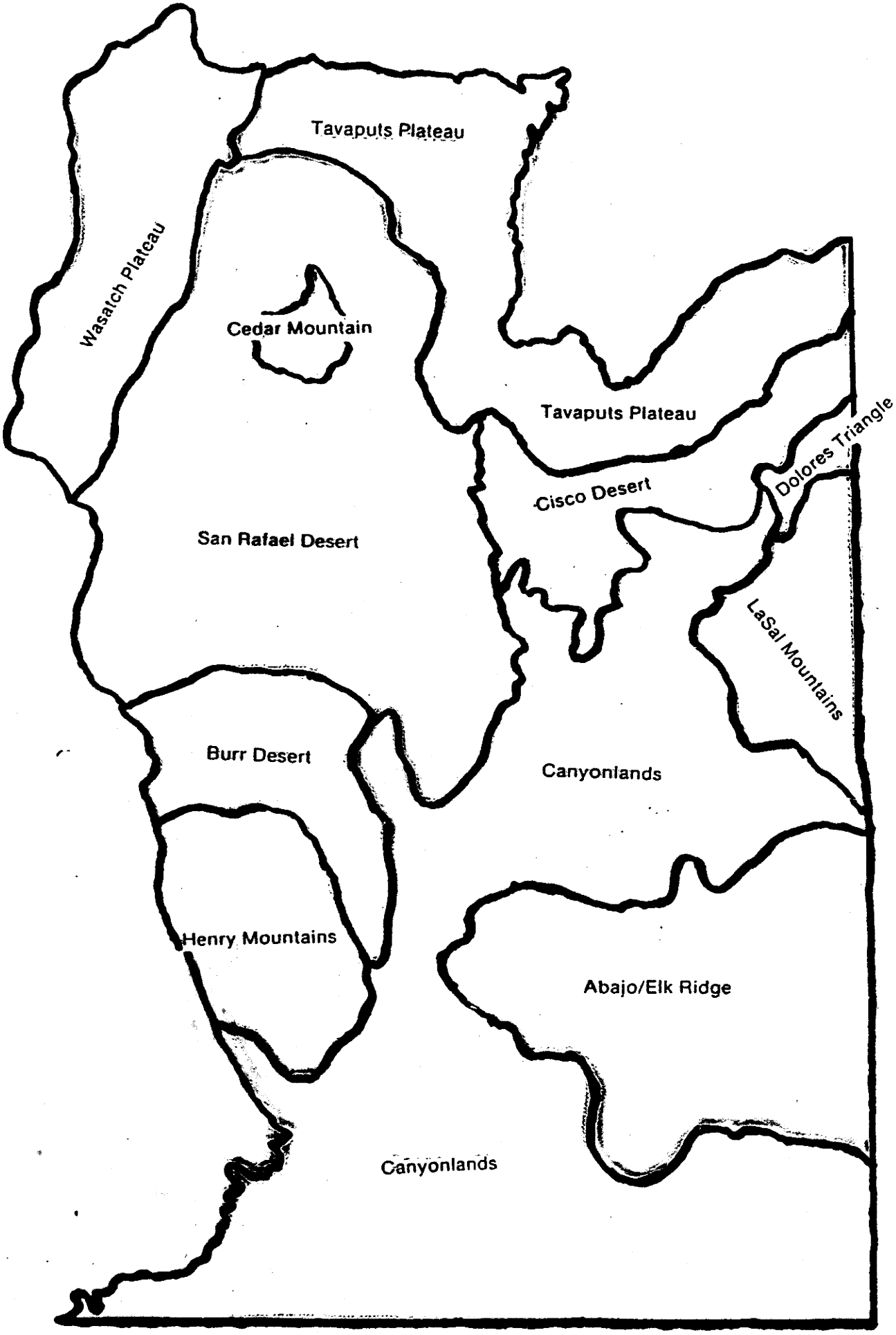
INTRODUCTION

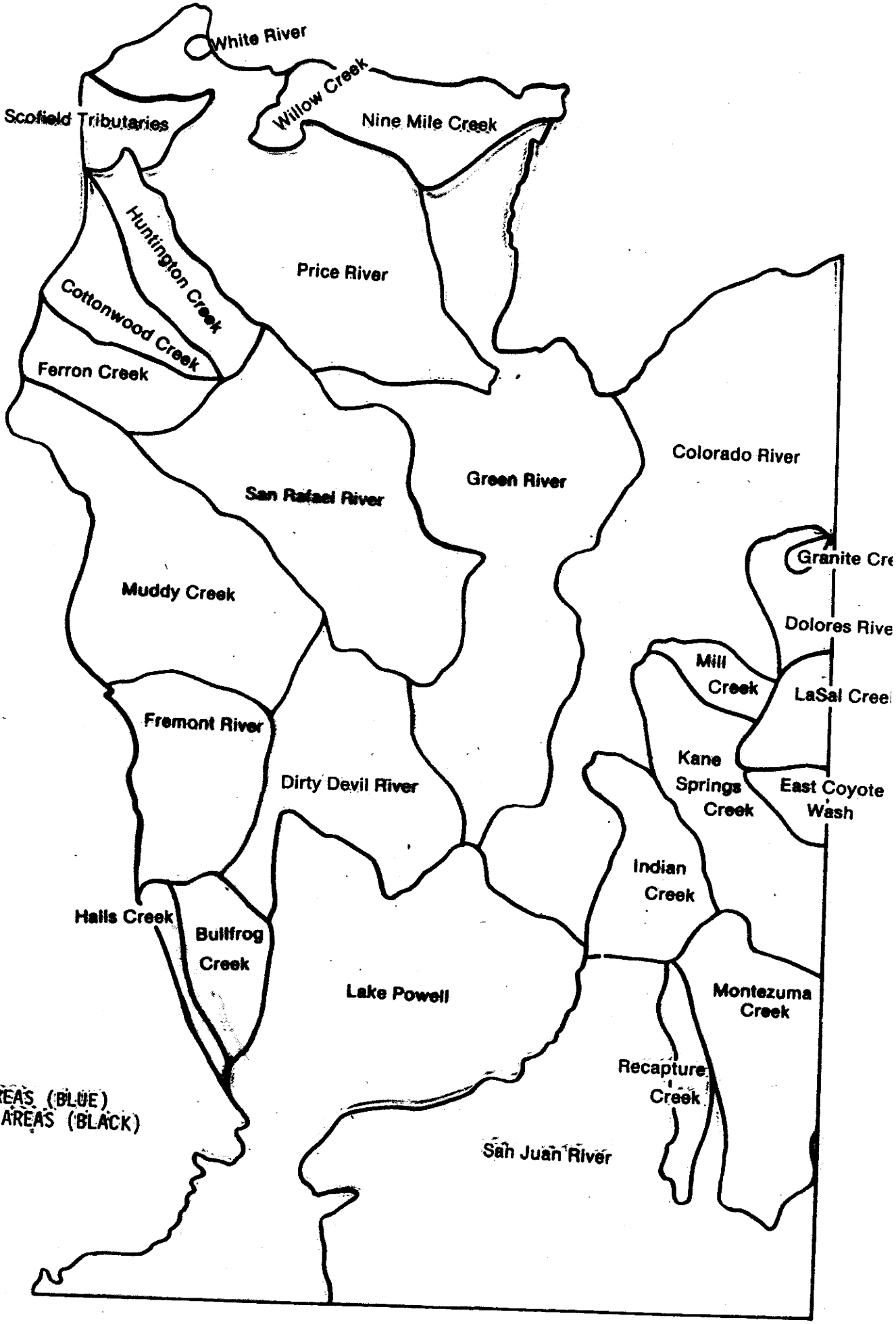
This publication addresses the ecology of five classes of vertebrate wildlife that inhabit southeastern Utah - piscinian (fish), amphibian, reptilian, avian (birds), and mammalian species. Today 481 species inhabit the region as compared to 450 species when pioneers arrived. Thirty-nine exotics have established populations during that time. Other native species have become endangered, extinct, or extirpated from the region.

Southeastern Utah accounts for about one-fourth of the state's land mass and supports a diverse and abundant wildlife population. Geographically, southeastern Utah represents the east drainages of the Wasatch Plateau, the south drainages of the Tavaputs Plateau and most of the drainages for the Utah portion of the Colorado Plateau. The Colorado Plateau is diverse in structure and in southeastern Utah hosts Cedar Mountain, Henry Mountains, Abajo/Elk Ridge, LaSal Mountains, Dolores Triangle, San Rafael Desert, Burr Desert, Cisco Desert, and Canyonlands (Figure 1).

The southeastern region lies within the upper Colorado River drainage basin and Lake Powell captures flow from the entire region. Lake Powell is an "on-stream" reservoir. It is situated on the Colorado River, which is a fourth order stream that discharges into the Gulf of California in Mexico. Twenty-seven drainage areas have been delineated within southeastern Utah (Figure 1).

Land-use planners, ecologists, and governmental decision makers must form a partnership such that the complex relationship between living organisms (plants and animals) and their environment are assessed in terms of man's activities. Human population growth continues to challenge wildlife's future. Planning and resultant


Tavaputs Plateau
Wasatch Plateau
Cedar Mountain
Tavaputs Plateau
Dolores Triangle
Cisco Desert
San Rafael Desert
LaSal Mountains
Burr Desert
Canyonlands
Henry Mountains
Abajo/Elk Ridge
Canyonlands



DRAINAGE AREAS (BLUE)
GEOGRAPHIC AREAS (BLACK)

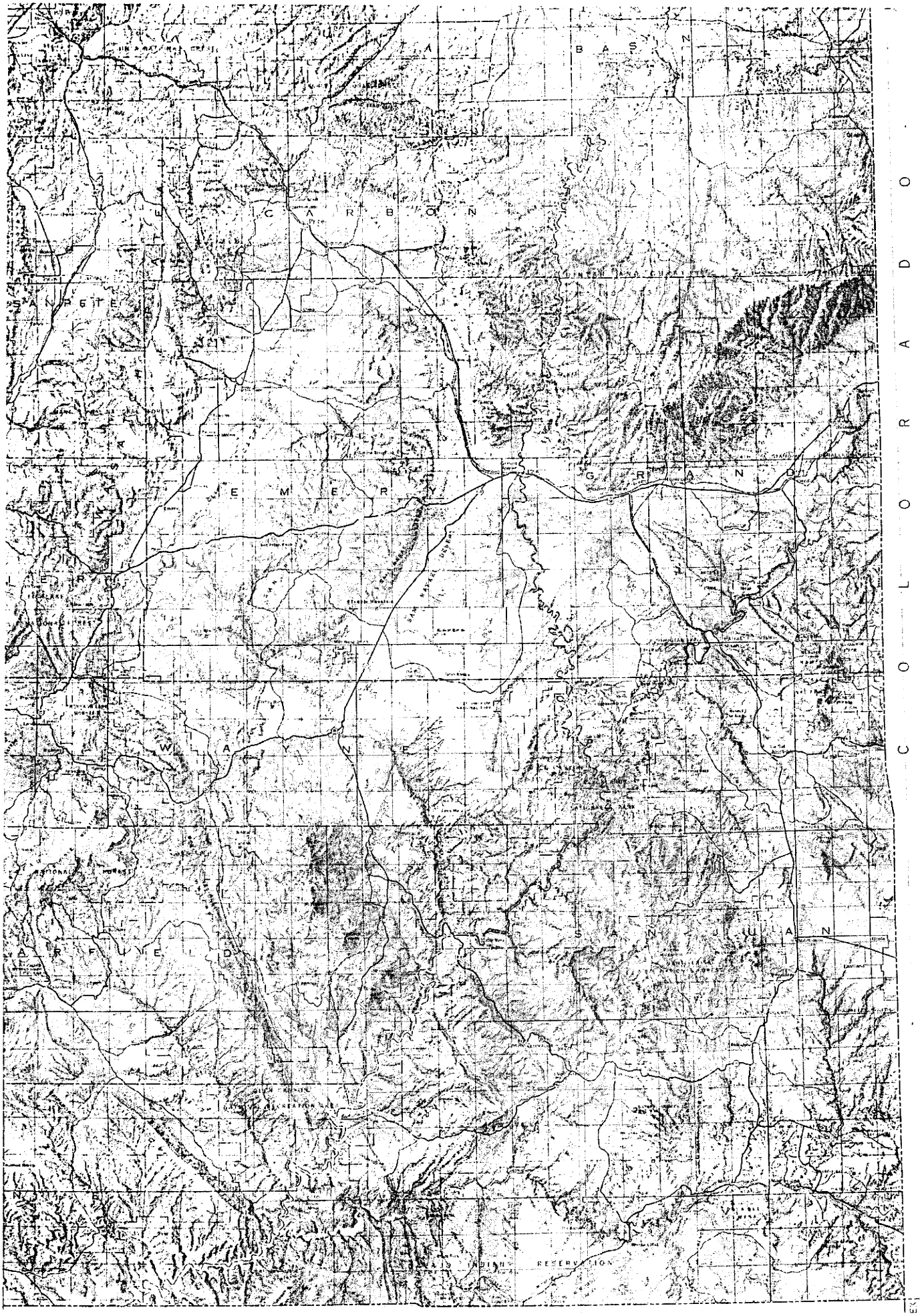


Figure 1. Southeastern Utah

decisions that maintain a healthy environment are the key to wildlife and even human health and survival on this planet. Wildlife is an important barometer to just how well we are doing.

Land-use planners have a need to know not only which animals, but when they reside on a project area along with the relative biological value of the various ecosystems inhabited. This information coupled with knowledge of life requisites for individual species forms the premise to understanding impacts on wildlife from man's activities. Once those impacts are recognized, plans can be formulated to avoid or minimize problems. Ultimately, mitigation must be designed and implemented as compensation for damages to the wildlife resource. Again, knowledge of the project area's wildlife will be needed to formulate mitigation plans.

Definitions

An ecosystem is an identifiable area in which nonliving elements are assimilated by living organisms, then exchanged between plants and/or animals and finally released back into the physical environment to be recycled again.

Ecosystems, singularly or in aggregation, provide habitat for wildlife, which is simply the setting in which an animal is most likely to survive and reproduce. Sufficient space, food, water, and cover (shelter and concealment) represent basic life requisites of habitat for wildlife. Without question, the boundaries between ecosystems are not discrete. The intergrade zone is known as ecotone and provides for the greatest local diversity in ecological assemblage, since species, both plant and animal, from adjoining ecosystems are present.

Ecosystems can occur as continuous or disjunct features extending from low elevation to high elevation. Climate, precipitation, soils, and biota respond to changing elevations, slope, and aspect. Within that continuum there are definable ecological associations:

cold desert (3,700 to 5,800 ft), submontane (5,500 to 8,500 ft) and montane (6,500 to 12,721 ft).

The relative abundance given for each species is as follows:

(c) common - these species are found widespread and are abundant;

(l) limited - these species are common, but restricted to a particular area;

(u) uncommon - these species are widespread, but not abundant;

(o) occasional - these species are less abundant than those classed as uncommon, but they do periodically occur in the area;

(r) rare - these species are seldom observed because their populations have been reduced due to man's activities. Fortunately, they still occur in numbers adequate for survival;

(t) threatened - these species are threatened with becoming endangered;

(e) endangered - these species are endangered with eminent extinction (Species that are extinct have been lost worldwide, whereas species that have been extirpated from Southeastern Utah may survive in other areas.);

(a) accidental - these species regardless of their relative abundance are not normally found in this area; and

(k) these species are unknown to inhabit the area.

Seasonal status for avian species is as follows:

(Yl) yearlong resident - these species are represented by breeding and wintering populations that occur throughout the year;

(Wt) winter resident - these species migrate to inhabit the area primarily during winter;

(Su) summer resident - these species occur and reproduce in the area primarily during summer and usually migrate elsewhere during winter; and

(Tr) transient - these species only pass through the area during spring and/or fall migration, and do not remain in the area for any extended period of time.

Note: Transient birds are assumed to be included with (Yl), (Wt) and (Su) populations.

Ranking of relative biological value for ecosystems to population of individual species is as follows:

(C) critical - an area that provides for "sensitive" biological and/or behavioral requisites necessary to sustain the existence and/or perpetuation of one or more wildlife species;

(H) high-priority - an area that provides for "intensive" use by one or more wildlife species;

(S) substantial - an area that provides for "frequent" use by one or more wildlife species; and

(L) limited - an area that provides for only "occasional" use by one or more wildlife species.

Note: There can be crucial time periods in an animal's life cycle during which protection from man's disturbance is essential to the population's survival. During those times the animal's use area would be ranked as being of critical value.

METHODS

The authors surveyed published literature, unpublished agency studies and reports, as well as museum collections regarding southeastern Utah's wildlife. We also interviewed numerous professional wildlife ecologists and wildlife enthusiasts having expertise in the region. Direct observation of animals in the field along with specific sampling strategies helped determine our knowledge for many species.

After evaluating all of the information gathered, decisions were made concerning the likely inhabitation by vertebrate species of wildlife for each of the ecosystems within southeastern Utah. Those decisions also included a subjective but cumulative assessment of data by the authors concerning relative biological value of the various ecosystems to each species of wildlife. The evaluation also identifies the various ecological associations utilized by each wildlife species. This task segregated data for terrestrial species by geographic area within the region. Piscinian (fish) species were evaluated as per major drainage areas. Relative abundance for each species was decided upon and, in the instance of avifauna, seasons of use are identified. A brief evaluation of life requisites for each animal is given. Our focus is on crucial periods, critical valued use areas and important habitat needs for each species.

Species are arranged phylogenetically by family. Genus followed by species nomenclature are ordered alphabetically. Decisions on current acceptable common and scientific names follow Robins, et. al., 1980 and their preliminary draft to be released in 1991, for fish species and USDI/Fish and Wildlife Service, 1987, for amphibians, reptiles, birds, and mammals.

RESULTS

Southeastern Utah's Ecosystems

Eighteen ecosystems characterized as either upland (urban, agricultural, alpine, spruce-fir, aspen, ponderosa, sagebrush-grass, mountain brush, pinyon-juniper, saltbush-grass, blackbrush, grassland, and barren) or wetland (marsh, riparian, mesic meadow, stream, and lake) exist in southeastern Utah. Each ecosystem is defined by its dominant vegetation or some other dominant nonbiotic feature (Figure 2).

Upland Ecosystems

Uplands are characterized as xeric (dry or only small amounts of moisture) to mesic (moderate amounts of moisture) and only support vegetation from water that is available through local precipitation. A brief description of each upland ecosystem found in southeastern Utah follows.

"Urban ecosystems" encompass lands developed for urban, suburban, industrial and transportation purposes. Urban areas are situated within all ecological associations. Typically, ornamental vegetation predominates and natural vegetation is generally excluded. The presence of humans and man-made developments is apparent (Figure 2).

"Agricultural ecosystems" are characterized by cultivated croplands or pasture lands. They can be found in the cold desert and submontane ecological associations. Agricultural areas have been developed for crop production and animal husbandry. The presence of man is apparent, but substantially less than in urban areas (Figure 2).

Figure 2. Presence of ecosystems by ecological association in the geographic areas of southeastern Utah.

Geographic Areas (Elevation in feet)

Ecosystems along with (1) Cold Desert (3,700–5,800 ft.); (2) Submontane (5,500–8,500 ft.); and (3) Montane (6,500–12,721 ft.) ecological associations.

UPLANDS

Geographic Areas (Elevation in feet)	URBAN			AGRICULTURAL			ALPINE			SPRUCE/FIR			ASPEN			PONDEROSA			SAGEBRUSH/GRASS			MOUNTAIN BRUSH			PINYON/JUNIPER			SALTBUSH/GRASS			BLACKBRUSH			GRASSLAND			BARREN		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Wasatch Plateau (5,500–10,741)		X	X		X				X			X			X			X		X	X		X			X									X	X		X	X
Tavaputs Plateau (5,500–10,118)					X							X			X			X		X	X		X			X									X	X		X	X
Cedar Mountain (5,500–7,664)																				X			X			X									X			X	
Henry Mountains (5,500–11,506)					X				X			X			X			X		X	X		X			X						X			X	X		X	X
Abajo/Elk Ridge (5,500–11,362)		X			X				X			X			X			X		X	X		X			X						X			X	X		X	X
LaSal Mountains (5,500–12,721)		X			X				X			X			X			X		X	X		X			X						X			X	X		X	X
Dolores Triangle (3,937–7,428)				X	X														X	X			X			X		X			X	X		X	X		X	X	
San Rafael Desert (4,120–7,920)	X	X		X	X														X	X			X			X		X			X	X		X	X		X	X	
Burr Desert (4,500–6,522)	X			X															X	X			X			X		X			X	X		X	X		X	X	
Cisco Desert (3,937–5,300)	X			X															X									X						X			X		
Canyonlands (3,700–10,388)	X	X		X	X							X			X			X	X	X	X		X			X		X			X	X		X	X	X	X	X	X

WETLANDS

Geographic Areas (Elevation in feet)	MARSH			MESIC MEADOW			RIPARIAN			STREAM			LAKE		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Wasatch Plateau (5,500–10,741)		X	X		X	X		X	X		X	X		X	X
Tavaputs Plateau (5,500–10,118)		X	X		X	X		X	X		X	X		X	X
Cedar Mountain (5,500–7,664)		X			X			X			X			X	
Henry Mountains (5,500–11,506)		X	X		X	X		X	X		X	X		X	X
Abajo/Elk Ridge (5,500–11,362)		X	X		X	X		X	X		X	X		X	X
LaSal Mountains (5,500–12,721)		X	X		X	X		X	X		X	X		X	X
Dolores Triangle (3,937–7,428)	X	X		X	X		X	X		X	X		X	X	
San Rafael Desert (4,120–7,920)	X	X		X	X		X	X		X	X		X	X	
Burr Desert (4,500–6,522)	X	X		X	X		X	X		X	X		X	X	
Cisco Desert (3,937–5,300)	X			X			X			X			X		
Canyonlands (3,700–10,388)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

"Alpine ecosystems" exist only in the montane zone above timberline, which usually begins around 10,000 feet. Dominating vegetation includes grasses, forbs, lichens and mosses. In areas with enough moisture, dwarfed willows or other stunted woody plants may occur (Figure 2).

"Spruce-fir ecosystems" occur only in the montane zone. Engelmann spruce (Picea engelmanii) and alpine fir (Abies lasiocarpa) are the most likely co-dominant species of this ecosystem. An array of other spruce or fir species may also dominate. Understory vegetation in this ecosystem is generally poorly developed due to shading. Conifers that grow near timber line are often dwarfed. This stunted conifer area is commonly referred to as krumholz (Figure 2).

"Aspen ecosystems" are dominated by quaking aspen (Populus tremuloides) and occur only in the montane zone. Aspen often lies between coniferous ecosystems and ponderosa or mountain brush ecosystems. Frequently aspen is only present as an inclusion in coniferous forests. As an ecosystem, aspen is declining in aerial distribution due to conifer invasion. A dense understory of grasses, forbs, and shrubs is generally present in aspen areas. In fact, aspen areas are recognized for their extraordinary production of forage for grazing ungulates (Figure 2).

"Ponderosa ecosystems" are dominated by the ponderosa pine (Pinus ponderosa) and occur only in the montane zone. The ponderosa pine is intolerant of shade and therefore predominates. It occurs on north as well as sunny, south-facing slopes. Old growth stands create the classical open forest setting, whereas stands managed for timber harvest support a more diverse understory (Figure 2).

"Sagebrush-grass ecosystems" are dominated by sagebrush (Artemesia spp.) and grass species. Forbs can be abundant. The relative abundance of each vegetation class varies with range condition. This ecosystem can also support a scattering of other shrubs and

trees. Sagebrush-grass ecosystems can be found in all ecological associations (Figure 2).

"Mountain brush ecosystems" are found only in the submontane ecological association. This ecosystem is often dominated by either gambel oak (Quercus gambeli) or maple (Acer spp.). However, other shrub species may be dominant and are almost always present. Grasses and forbs comprise the understory (Figure 2).

"Pinyon-juniper ecosystems" are dominated by pinyon pine (Pinus edulis) and juniper (Juniperus spp.). This ecosystem occurs only in the submontane ecological association. A diverse vegetative understory community is often lacking over wide expanses of the ecosystem. Thus, irregular shaped, but sometimes extensively sized openings have been created in the pinyon-juniper ecosystem for conversion to more productive sagebrush-grass, mountain brush or grassland settings (Figure 2).

"Saltbush-grass ecosystems" are dominated by a variety of saltbushes (Atriplex spp.) usually in association with Indian ricegrass (Oryzopsis hymenoides) and broom snakeweed (Gutierrezia sarothrae). Forbs are more or less abundant depending on range condition. This ecosystem only occurs in the cold desert ecological association (Figure 2).

"Blackbrush ecosystems" are dominated by blackbrush (Coleogyne ramosissima) and ephedra (Ephedra spp.). This ecosystem only occurs in the cold desert and submontane ecological associations. It can be dominated by blackbrush in pure stands to the exclusion of other shrubs. Grasses, particularly Indian ricegrass and galleta grass (Hilaria jamesii), as well as forbs are usually present. Their representation is dependent upon range condition (Figure 2).

"Grassland ecosystems" are present in all ecological associations. Dominant grasses vary with elevation and range conditions. Forbs and shrubs may be present in limited quantities, but grasses dominate the area (Figure 2).

"Barren ecosystems" occur in all ecological associations. Badlands, talus slopes and cliffs, as well as extensive sandstone formations typify this ecosystem (Figure 2).

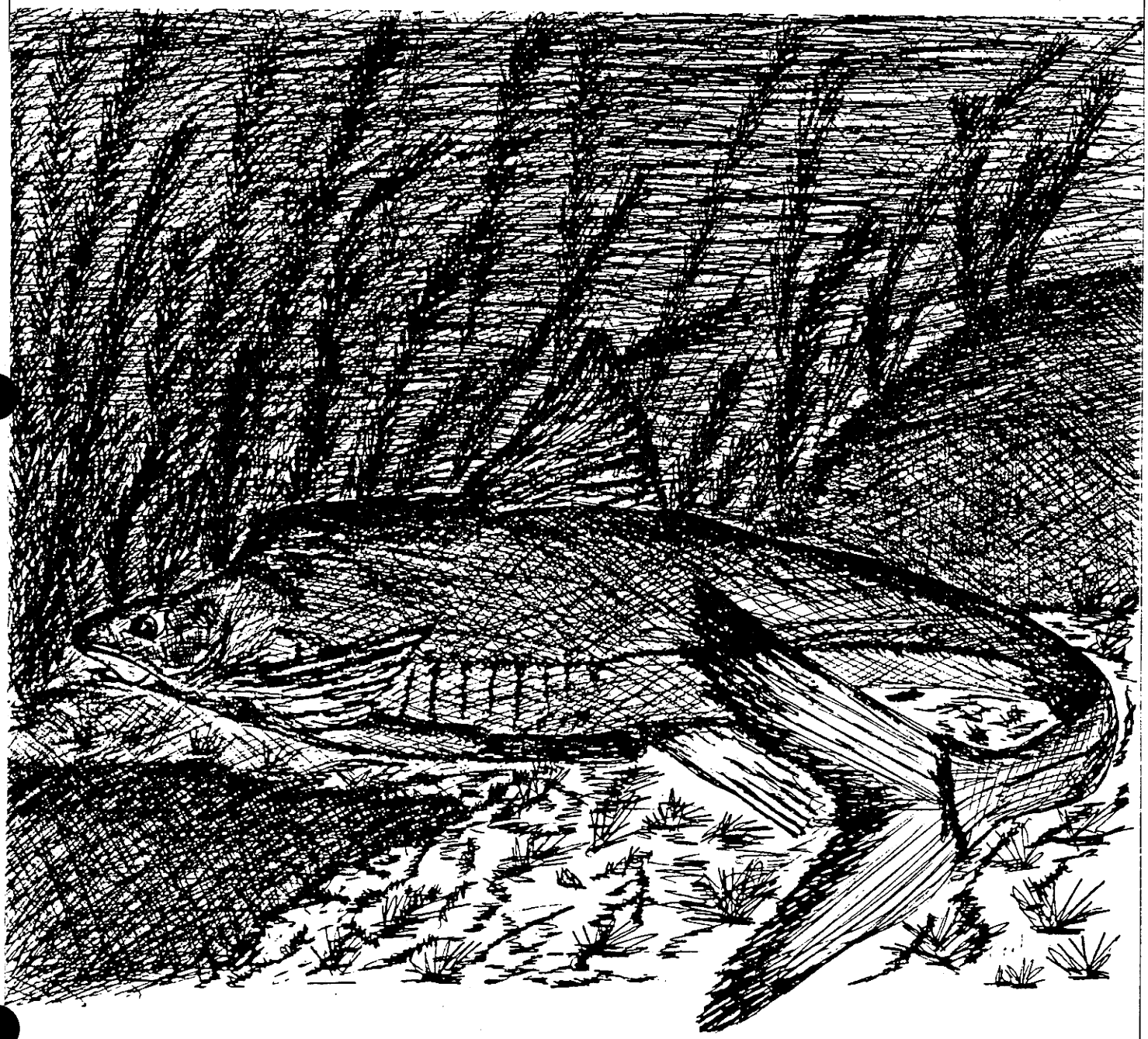
Wetland Ecosystems

Wetlands in Southeastern Utah can be found in all ecological associations. They show a unique aquatic and terrestrial relationship. Wetlands are defined as either (1) permanently or seasonally flooded areas, or (2) areas that evidence domination by wetland plants as determined by aerial cover or (3) non-flooded areas that provide hydric soils within the rooting depth of vegetation, if any. Surface areas of wetlands may never be flooded, but can be periodically or continuously flooded. Moisture conditions among wetlands vary from hydric (an abundance of moisture) to mesic (moderate amounts of moisture) and even xeric (dry or only small amounts of moisture) on a seasonal basis. In all situations, moisture, particularly during the growing season, is significantly in excess of that otherwise available through local precipitation. This is in contrast to uplands which are entirely or largely dependent upon local precipitation for their water supply.

"Streams" (water courses), "lakes" (impoundments) as well as "marsh," "mesic meadow," and "riparian" wetlands may singly or in aggregation comprise a wetland ecosystem. Streams are the potentially wetted zone for flowing water in perennial, ephemeral, or intermittent channels. Lakes are the zones represented by the high water level of man-made or natural impoundments that permanently or temporarily hold standing water. Marsh, mesic meadow, and riparian wetlands represent a zone that is often, but not necessarily transitional between uplands and stream or lake areas. Some wetland plants, due to their high water volume demand, are considered hydrophytic and are obligated to only survive in wetland ecosystems. Other wetland plants are not hydrophytic and are

considered facultative to surviving in either wetland or upland ecosystems. Upland plants in contrast to wetland plants can only survive in upland ecosystems. Marshes are characterized by emergent grass-like vegetation. Mesic meadows are characterized by obligate and facultative wetland species of grasses and/or forbs. Riparian areas are characterized by a dominance of obligate and facultative woody wetland species (Figure 2).

SOUTHEASTERN UTAH'S FISH



Southeastern Utah's Fish (Piscinian Species)

Today, there are 42 species of freshwater fish inhabiting southeastern Utah's streams and lakes. At the time of Utah's settlement (1847) only 12 species of native (indigenous) fish inhabited the region. Transplants of 30 species exotic to southeastern Utah have advantaged altered habitats, particularly for development of sport fisheries. Unfortunately, habitat change caused by man and competition with exotic fish has caused four indigenous species -- humpback chub (Gila cypha), bonytail chub (Gila elegans), Colorado squawfish (Ptychocheilus lucius), and razorback sucker (Xyrauchen texanus) -- to become endangered with extinction. These same problems have caused another indigenous species the roundtail chub (Gila copei), to become rare, although still occurring in numbers adequate for survival. Yet another species categorized as rare, the leatherside chub (Gila copei), was introduced as an exotic into the region. It is also rare in its native range. Fortunately, no fish species have become extirpated or extinct.

Without question, streams support more fish species than lakes. Generally, numbers of species decrease as elevation increases. For example, Ferron Creek drainage area at desert elevations supports many times more species of fish in streams or lakes as compared to numbers at submontane or montane elevations (Table 1).

Each fish species has its own set of habitat requirements and each commands its own range of adaptability to changes in that environment. Although a fish population may survive the effects of an environmental change; reproduction, feeding, and general behavioral patterns may be negatively impacted, resulting in decreased reproductive success. The net result could be a smaller population.

Changes to water quality parameters can occur naturally or by man. In order to assess potential impacts and subsequently mitigate losses or disturbances, there must be an understanding of some of the life requisites and habitat requirements of fish.

Table 1. Numbers (#) of piscinian (fish) species that now (1990) inhabit drainage areas in southeastern Utah and the proportion (%) of that total which inhabit streams or lakes of each ecological association.

Drainage Areas / # of Species	ECOLOGICAL ASSOCIATIONS					
	Cold Desert (3,700–5,800 ft.)		Submontane (5,500–8,500 ft.)		Montane (6,500–12,721 ft.)	
	stream	lake	stream	lake	stream	lake
Lake Powell / 29	0	100	0	0	0	0
San Juan River / 22	100	64	0	0	0	0
Recapture Creek / 10	80	10	10	20	10	10
Montezuma Creek / 6	100	0	0	0	0	0
Halls Creek / 0	0	0	0	0	0	0
Bullfrog Creek / 0	0	0	0	0	0	0
Dirty Devil River / 20	90	0	70	0	20	0
Fremont River / 5	100	0	60	0	20	0
Muddy Creek / 7	86	0	71	14	29	14
Colorado River / 35	94	28	60	0	26	0
Green River / 31	97	10	64	10	64	6
San Rafael River / 23	91	13	61	0	13	0
Ferron Creek / 10	80	10	70	50	60	40
Cottonwood Creek / 10	60	10	70	30	60	40
Huntington Creek / 13	61	46	61	38	38	23
Price River / 18	83	28	83	22	67	28
Willow Creek / 3	33	0	67	67	67	67
White River / 9	22	0	44	0	67	11
Scofield and Tributaries / 7	29	14	43	14	86	71
Nine Mile Creek / 2	50	0	100	50	0	0
Indian Creek / 2	0	0	50	50	100	100
Kane Springs Creek / 0	0	0	0	0	0	0
Mill Creek / 5	40	20	100	20	60	40
Dolores River / 17	100	6	60	0	12	0
East Coyote Wash / 1	100	100	0	0	0	0
La Sal Creek / 4	0	0	75	25	50	50
Granite Creek / 1	0	0	0	0	100	100

Fish are "cold-blooded" animals which rely heavily on their environment for regulation of body temperature. Dependent upon the species, its health, and environmental factors, long-term deviations from optimum temperatures could directly hinder biological processes of the species and may even result in disease and death. Short-term drastic fluctuations in temperature could cause immediate shock and death to fish. Indirect impacts to fish can occur from the loss of various food species (hydrophytes, plankton, and invertebrates) due to temperature changes or other pollution factors. Fish reproduction and larval survival appear to be the most sensitive life processes to changes in temperature outside the optimum range.

The amount of dissolved oxygen (DO) in water is often used as a gauge to measure the potential of the stream or lake to sustain aquatic life. Generally, a DO concentration of 5.0 parts per million (ppm) is necessary to maintain healthy fish populations. Again, this will vary depending on species, age, and health of the organism as well as other environmental factors. DO levels are directly related to temperature changes. As temperatures increase, DO levels decrease, while at the same time the dissolved oxygen requirements of fish increase. At spawning areas, consideration also needs to be given to the substrate type where eggs are deposited when making decisions on desirable DO concentrations. If the substrate is not sufficiently porous to allow easy flow of oxygenated water to the egg surfaces, DO levels of only 5.0 ppm may not be adequate to sustain the eggs through incubation.

Total dissolved solids (TDS) is a term that describes dissolved inorganic salts, small amounts of dissolved organic matter, and other dissolved materials in water. Most freshwater fish cannot tolerate TDS concentrations exceeding 15,000 ppm. Salinity factors specifically identify the dissolved inorganic salt content of water of which carbonates, chlorides, sulfates, nitrates, sodium, potassium, calcium, and magnesium are the principal ions.

Turbidity, which is most often measured as nephelometric turbidity units (NTU), describes the amount of suspended solids in the water column. Jackson turbidity units (JTU) are just another type of turbidity measurement. Suspended solids, identified in parts per million (ppm), reduce the amount of light penetration through the water. This can subsequently reduce the abundance of food available to the fish by hindering growth of the food species. Resultant turbidity of water due to suspended solids can also disorient fish to the point of modifying their behavioral patterns, movements, and migrations. More immediate impacts of turbidity can directly abrade the mucous coating of a fish and reduce its resistance to disease. This can result in death or a reduced growth rate. Generally speaking, increases in NTU that exceed 10% of background conditions represent negative impacts to aquatic systems.

Settleable solids fall into gravel spawning beds and can cause high egg and larval mortalities. Silt can adhere to egg surfaces preventing oxygen and carbon dioxide exchanges. Damage can also occur to the invertebrate population. If settleable solids are organic, their accumulation will result in decreased dissolved oxygen concentrations.

The measure of hydrogen ion activity in water (pH) is regulated by a water's carbonate system. The range of 6.5 to 9.0 pH is considered suitable and healthy for freshwater aquatic life. Generally, pH values outside of this acceptable range cause adverse physiological effects to aquatic life. Such effects increase in severity as the degree of pH deviation increases until mortality is experienced. Rapid variations of pH within this range should be avoided as resultant adverse effects could result in mortality. Changes in pH effects dissociation of weak acids and bases which also results in the increase of toxic effects of metallic ions on fish life.

Life requisite information for the following fish species attempts to take into account some of the water quality parameters that can potentially affect populations. In some cases, optimum conditions are specified, whereas other parameters are analyzed for conditions considered to be lethal. In addition, life history information is outlined with focus on

preferred habitat, spawning seasons, and egg incubation periods. All water bodies are considered critical valued habitat for the obvious reason that fish require these habitats for basic life functions. Both stream and lake categories broadly refer to bodies of running or standing water, respectfully, regardless of size.

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Indigenous/exotic Drainage Areas arranged by stream order	Relative Abundance by Ecological Association[1] Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
		Stream	Lake	Stream	Lake	Stream	Lake
Family: Salmonidae *cutthroat trout Oncorhynchus clarki These indigenous game fish inhabit cold, clear waters of all elevations. They do well in small streams. Optimum DO concentrations are >7ppm at water temperatures ≤59°F and ≥9ppm at water temperatures >59°F. It has been reported that feeding behavior stops at turbidity levels >35ppm. Spawning occurs from March through mid June when water temperatures exceed 40°F. At 50°F, the eggs will incubate for 41 days. Clean gravel/cobble zones (0.08 to 2.5 inch diameter), having a substrate depth and a depth of flowing water each of at least 6 inches, provide optimum conditions for redd development. The Yellowstone (O.c. bouvieri), Snake River (O.c. ssp.), and Colorado (O.c. pleuriticus) subspecies inhabit southeastern Utah.	Lake Powell						
	San Juan River						
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River						
	Fremont River						
	Muddy Creek	o		c		c	c
	Colorado River	u					
	Green River	u					
	San Rafael River	o					
	Ferron Creek	u	c	c	c	c	c
	Cottonwood Creek	o					
	Huntington Creek	u	u	c	c	c	c
	Price River	c	u	c	c	c	c
	Willow Creek			c	c	c	c
	White River					c	c
	Scofield Tributaries					c	c
	Nine Mile Creek						
	Indian Creek			c	c	c	c
	Kane Springs Creek						
	Mill Creek			u		c	c
	Dolores River						
	East Coyote Wash						
	LaSal Creek			c	c	c	c
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
*rainbow trout Oncorhynchus mykiss These exotic nongame fish inhabit cold, clean waters of all elevations. "pH" values of 7 to 8 are optimal for growth. Minimum DO values of 4.0 to 4.5 ppm are required for healthy populations. They survive well in fast water, although they are stocked in many lakes and small farm ponds. Spawning occurs between April and June when water temperatures approach 44 to 48°F. At 50°F, 41 days is required for incubation. Optimum growth occurs at water temperatures of 62°F. Clean gravel/cobble zones (0.08 to 2.5 inch diameter), having a substrate depth and a depth of flowing water each of at least 6 inches, provide optimum conditions for redd development. This species does not compete well with kokanee, Utah chubs, or white suckers.	Lake Powell		u				
	San Juan River						
	Recapture Creek			l	l	l	l
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River						
	Fremont River	u					
	Muddy Creek	o		c		c	c
	Colorado River	u					
	Green River	u					
	San Rafael River	u					
	Ferron Creek	u	u	l	c	c	c
	Cottonwood Creek	u	u	u	u	c	c
	Huntington Creek	u	c	c	c	c	c
	Price River	c	c	c	c	c	c
	Willow Creek			u	l	c	c
	White River						
	Scofield Tributaries					c	c
	Nine Mile Creek			u	l		
	Indian Creek						
	Kane Springs Creek						
	Mill Creek	u	u	u	u	u	c
	Dolores River						
	East Coyote Wash	u	l				
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic Drainage Areas arranged by stream order	Relative Abundance by Ecological Association[1] Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
		Stream	Lake	Stream	Lake	Stream	Lake
common carp Cyprinus Carpio These exotic nongame fish inhabit waters of cold desert, submontane, and montane zones. They feed primarily on midge larvae found in algae. Spawning occurs in heavily vegetated, shallow waters where turbidity values are usually >20 JTU. The spawning season is from April-August when water temperatures are 62-68°F. The eggs will hatch in 4 to 5 days, and the fry will remain in the shallow waters for 2 to 8 weeks. Bodies of water with both shallow and deep areas provide preferred habitat. Optimum growth occurs at dissolved oxygen concentrations of 6 to 7 ppm. Adult carps are capable of gulping surface air when DO concentrations are≤0.5 ppm. This species is also tolerant of high salinities; "pH" values of 6.5 to 8.5 are optimum.	Lake Powell		c				
	San Juan River	c					
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River						
	Fremont River						
	Muddy Creek						
	Colorado River	c	c	c	c	c	c
	Green River	c	c				
	San Rafael River	c	l				
	Ferron Creek						
	Cottonwood Creek						
	Huntington Creek	c	c	c	c	c	c
	Price River	l	l	l	l	l	l
	Willow Creek						
	White River						
	Scofield Tributaries					u	l
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek	c	l				
	Dolores River						
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
Utah chub Gila atraria These exotic nongame, omnivorous fish inhabit waters of all elevations and are highly competitive with salmonids. They are inadvertently, but frequently introduced as a release of unused "bait". Attempts to eradicate them from potentially good trout fishing waters are costly and often unsuccessful. Spawning occurs from April-July when water temperatures range from 51-68°F. Eggs hatch in 3 days. Utah chubs are found in both cool (59-68°F) and warm (80-88°F) waters, most frequently at depths of 1.5 to 4 feet. A densely vegetated substrate of mud, clay, or sand is preferred.	Lake Powell						
	San Juan River						
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River						
	Fremont River						
	Muddy Creek						
	Colorado River	o	o	o	o	o	o
	Green River	u	u				
	San Rafael River	u					
	Ferron Creek	u					
	Cottonwood Creek	u	u				
	Huntington Creek	c	c	u		o	o
	Price River	c	l	u		c	l
	Willow Creek						
	White River						
	Scofield Tributaries					l	l
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek						
	Dolores River						
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
redside shiner Richardsonius balteatus These exotic, omnivorous, nongame fish are widely distributed throughout all elevations. Spawning occurs numerous times between April and July in shallow streams when water temperatures exceed 50°F. Once water temperatures reach 69-73°F eggs hatch within 3-7 days. The fish display both daily and seasonal movements. In general, they can be found in shallow, vegetated areas during the day, and deeper waters at night. Likewise, they frequent shoreline waters beginning in September but will move to deeper waters for the spring and summer.	Lake Powell		c				
	San Juan River						
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River	c					
	Fremont River			c			
	Muddy Creek						
	Colorado River	u		u		c	
	Green River	u		u		c	
	San Rafael River	u		u			
	Ferron Creek						
	Cottonwood Creek						
	Huntington Creek						
	Price River					c	
	Willow Creek						
	White River					c	
	Scofield Tributaries					l	c
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek						
	Dolores River	u		c			
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
flannelmouth sucker Catostomus latipinnis These indigenous nongame fish inhabit waters of cold desert and submontane elevations. DO concentration levels >7.0 ppm and pH values between 6.5 and 8.5 are optimal. The species can tolerate highly turbid conditions. They feed on aquatic vegetation and zooplankton. Spawning occurs in riffle areas from April to May when water temperatures reach 43-50°F. The eggs will hatch after about 6 days. Adults can be found at depths of 1 to 20 feet, in sparsely vegetated pools of large streams. Construction of dams can prove to have negative effects on populations as cold water releases prevent spawning downstream.	Lake Powell		c				
	San Juan River	c		c			
	Recapture Creek	c					
	Montezuma Creek	c					
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River	c					
	Fremont River			c			
	Muddy Creek	c		c			
	Colorado River	c		c			
	Green River	c		c			
	San Rafael River	c		c			
	Ferron Creek	l		l	c		
	Cottonwood Creek	c		c			
	Huntington Creek	l		l			
	Price River	u		u			
	Willow Creek						
	White River			u			
	Scofield Tributaries	u		u			
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek						
	Dolores River	c		c			
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental.

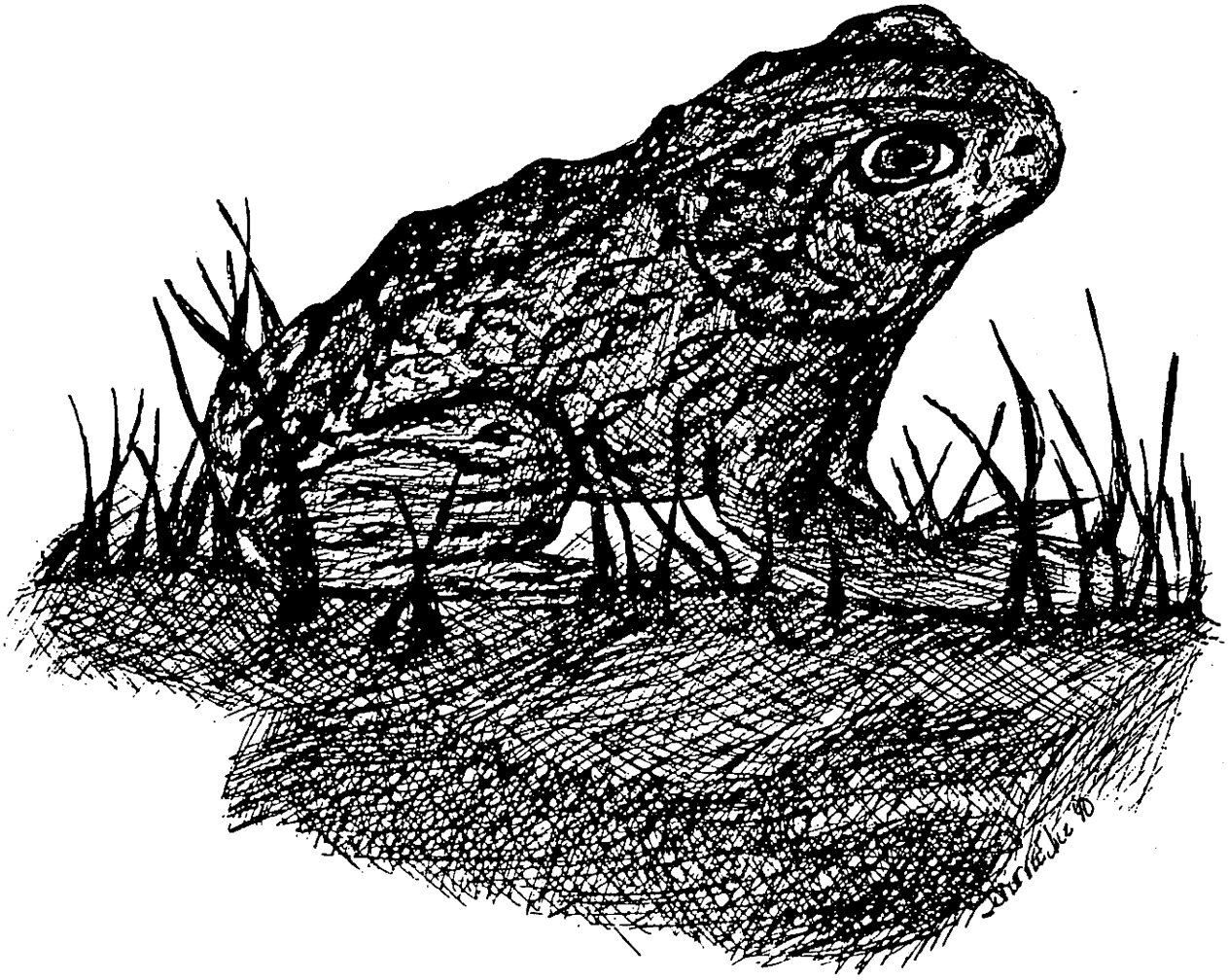
Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
mountain sucker Catostomus platyrhynchus These indigenous nongame fish inhabit waters of submontane and montane zones. They feed on aquatic vegetation and zooplankton. Spawning occurs over gravelly surfaces from June to July at water temperatures of 51-66°F. The young appear in shallow, quiet waters by mid June, so the incubation period appears to be short. Adults prefer to inhabit clear, swift-moving waters that are 1-3 feet deep, although they can withstand periodic turbidity. DO concentrations >7.0 ppm and pH values in the range of 6.5 to 8.5 provide optimal conditions. Temperatures over 69°F are harmful to these fish. Habitat loss due to the construction of dams can have adverse effects on populations.	Lake Powell						
	San Juan River						
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River						
	Fremont River			u			
	Muddy Creek						
	Colorado River						
	Green River						
	San Rafael River			u		c	
	Ferron Creek					l	
	Cottonwood Creek			u		c	
	Huntington Creek				l	l	
	Price River			u		c	
	Willow Creek						
	White River			u		c	
	Scofield Tributaries			u		c	
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek						
	Dolores River						
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

Piscinian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	indigenous/exotic	Relative Abundance by Ecological Association[1]					
		Cold Desert (3,700 - 5,800 Ft.)		Submontane (5,500 - 8,500 Ft.)		Montane (6,500 - 12,721 Ft.)	
	Drainage Areas arranged by stream order	Stream	Lake	Stream	Lake	Stream	Lake
*walleye Stizostedion vitreum These exotic game fish are carnivorous and occur at all elevations where waters maintain pH values of 6.0 to 9.0. Spawning occurs from April-May when water temperatures range from 42-48°F. Eggs are deposited between rocks in 3-9 feet of water with moderate currents. They are also known to use riprap along banks and dams for deposition of eggs. Walleye eggs hatch in 12-18 days. Adult fish prefer large, clear bodies of water up to 45 feet deep and 50-100 acres in size. They use the shallow areas for feeding and spawning. Optimum conditions for growth occur at water temperatures of 68-75°F and dissolved oxygen concentrations over 3.5 ppm. DO concentrations <1.0 ppm are considered lethal.	Lake Powell		l				
	San Juan River	o					
	Recapture Creek						
	Montezuma Creek						
	Halls Creek						
	Bullfrog Creek						
	Dirty Devil River	l					
	Fremont River						
	Muddy Creek						
	Colorado River	l		l			
	Green River	u		u			
	San Rafael River						
	Ferron Creek						
	Cottonwood Creek						
	Huntington Creek						
	Price River						
	Willow Creek						
	White River						
	Scofield Tributaries					o	o
	Nine Mile Creek						
	Indian Creek						
	Kane Springs Creek						
	Mill Creek						
	Dolores River						
	East Coyote Wash						
	LaSal Creek						
	Granite Creek						

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental

SOUTHEASTERN UTAH'S AMPHIBIANS



Southeastern Utah's Amphibians (Amphibian Species)

Thirteen amphibian species inhabit the ecosystems of southeastern Utah. Only the bullfrog (Rana catesbeiana) is exotic. All others are native and were likely present at the time of settlement (1847). The spotted frog (Rana pretiosa), which inhabits the west side of the Wasatch Plateau, has been included due to its high interest value as a Utah Division of Wildlife Resources listed threatened species. There is the potential for land use activities on the east side of the Wasatch Plateau to negatively impact the critical valued habitats of the spotted frog due to the westerly dip of groundwater flow.

To date no amphibian species in the region appear to be in jeopardy. Such is not the situation from a worldwide perspective. Caution and forethought relative to environmental protection should guide decisions regarding development and amphibians.

Amphibian dependence on water sources is evident in Table 2, where the wetland ecosystems contain the highest proportion of amphibians as compared with all other ecosystems. The agricultural ecosystem also supports a wide variety of species due primarily to the provision of water by irrigation practices. The majority of amphibian species in southeastern Utah inhabit the cold desert ecological association, followed by submontane, and montane zones. The tiger salamander (Ambystoma tigrinum) is the only species to inhabit the alpine, spruce/fir, aspen, and ponderosa ecosystems at montane elevations. It utilizes these ecosystems for foraging and burrowing, but maintains a close association with wetland areas (Table 2).

Moisture is the major limiting factor for the success of amphibian populations. Amphibians are dependent upon perennial, intermittent, or ephemeral water sources. Their scaleless skin, when exposed to air, will lose ambiotic fluid; particularly in dry environments with little humidity. They regain lost body fluid by absorbing it back through the skin from water sources or moist soil. Amphibians can be affected by changes to quantity of water and water quality parameters that include, but are not limited to,

temperature, pH, dissolved oxygen concentrations, and turbidity. If such changes occur, amphibian species do not have the ability to move great distances to new localities.

Generally, pH 6.5 to 9.0 is considered suitable for maintaining healthy populations of aquatic life as long as rapid fluctuations within this range are avoided. Dissolved solid concentrations exceeding 15,000 ppm result in the disappearance of most aquatic life. Adult frogs can survive 10,000 ppm dissolved solids, whereas eggs suffer negative impacts at 5,000 ppm. Turbidity can also affect the survival and growth rate of aquatic organisms. Silt can adhere to eggs and kill them by preventing oxygen and carbon dioxide exchanges.

Life requisite information in this section has been focused towards the identification of preferred aquatic characteristics for amphibians. Breeding dates and optimum water temperatures have been specified. The length of time required for the metamorphosis of the larval form to adult is also indicated. Negative impacts could result to the reproductive behavior, egg development, metamorphosis, and survival of amphibian populations when life requisites and habitat requirements are not taken into account. If land use plans can be developed to avoid crucial biological periods, as well as impacts to critical valued habitats, amphibian species are likely to maintain healthy populations.

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ambystomatidae tiger salamander Ambystoma tigrinum		Indigenous	S	S	L	L	L	L	L	L	L	L	L	L		C	C	C	C	C
	c	Wasatch Plateau	These fossorial, nongame, insectivorous salamanders inhabit all elevations. Breeding occurs from March to June in perennial or intermittent waters with a pH of 6.8 to 9.6, and water temperatures greater than 50°F. Eggs hatch after 14 days. Where conditions limit metamorphosis, larvae can breed. Only the Utah subspecies (A.t. utahensis) is known to inhabit southeastern Utah. The Arizona subspecies (A.t. nebulosum) may be found in the Canyonlands area. The introduction of bullfrogs, crayfish, and fish could be detrimental to populations.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
Family: Pelobatidae western spadefoot Scaphiopus hammondii		Indigenous		L								S	S	S		C	C	C	C	C
	k	Wasatch Plateau	These nongame toads inhabit cold desert, submontane, and montane elevations. They are insectivorous. Breeding occurs during May-July rains at perennial or intermittent waters. Eggs are laid on vegetation. They hatch within 2 days and metamorphosis to adult occurs within 4 to 6 weeks. They are restricted to the Four Corners area on the Navajo Indian Nation.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
				Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
Great Basin spadefoot *Scaphiopus intermontanus*		Indigenous			S		S	S	S	S	S	S	S	S	S		C	C	C	C	C
	c		Wasatch Plateau																		
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	c		Cisco Desert																		
	c		Canyonlands																		
Mexican spadefoot *Scaphiopus multiplicatus*		Indigenous			L						S	S	S				C	C	C	C	C
	k		Wasatch Plateau																		
	k		Tavaputs Plateau																		
	k		Cedar Mountain																		
	k		Henry Mountains																		
	l		Abajo/Elk Ridge																		
	l		LaSal Mountains																		
	k		Dolores Triangle																		
	k		San Rafael Desert																		
	k		Burr Desert																		
	k		Cisco Desert																		
	l		Canyonlands																		

These insectivorous, nongame toads inhabit cold desert, submontane, and montane zones. They are nocturnally active at air temperatures of 54-69°F. Breeding occurs during May-July rains in springs and temporary pools. Females probably produce just one clutch a year. Metamorphosis from egg to adult is rapid and can occur in as little as two weeks. These toads require loose soil that can be easily burrowed into for overwintering. Underground burrows are also utilized during dry periods.

These insectivorous, nongame toads inhabit submontane and montane zones. Breeding occurs during May-July rains at perennial or intermittent waters. Eggs hatch within 2 days, and metamorphosis to adult occurs within 4 to 6 weeks. They inhabit the Four Corners area on the Navajo Indian Nation, and they may be found in that same habitat type north of the San Juan River.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Bufonidae western toad Bufo boreas		Indigenous		L												C	C	C	C	C
	u	Wasatch Plateau	These insectivorous, nongame toads inhabit montane zones. They are active at air temperatures of 37-85°F. Breeding occurs in shallow, vegetated, still-water areas from January to September. Eggs are usually deposited in May or June. Metamorphosis usually takes 30-45 days. However, at elevations exceeding 9,000 ft., metamorphosis is delayed until the following summer. During dry conditions, they excavate burrows in loose soil or utilize those of other animals. The Boreal subspecies (B.b. boreas) inhabits southeastern Utah.																	
	u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Great Plains toad Bufo cognatus		Indigenous		S				S	S		S	S	S		C	C	C	C	C
	c	Wasatch Plateau	These nongame toads prefer grassland areas of cold desert and submontane zones. They are insectivorous. Breeding begins during March-September rainfalls in clear, shallow, ephemeral or intermittent pools. Eggs are deposited on submerged debris when water temperatures are 55-68°F. Larvae hatch in 2-3 days, and metamorphosis is complete after about 17 days, depending on temperatures. Although this species can be found in irrigated cropland, reproduction success in these areas is unknown.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
red-spotted toad Bufo punctatus		Indigenous		L								L		L		C	C	C	C	C
	k	Wasatch Plateau	These insectivorous, nongame toads inhabit rocky canyons of cold desert and submontane zones. Nocturnal and crepuscular activity occurs at air temperatures of 57-85°F. Breeding occurs from April to September and is initiated by rainfall. Eggs are laid one at a time on temporary pool bottoms that have little or no current. Metamorphosis occurs from July to October.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
Woodhouse's toad Bufo woodhousii		Indigenous		S					S					S		C	C	C	C	C
	c	Wasatch Plateau	These nongame toads inhabit cold desert and submontane zones. They are insectivorous and nocturnal. The water temperature for breeding, although unknown, is at least 59-64°F. Breeding occurs during rains of late spring and early summer. Shallow, still-water, perennial pools of varying turbidity and vegetative growth are used. Eggs incubate for 3-4 days. Metamorphosis occurs after 34-35 days. Woodhouse's subspecies (B.w. woodhousii) is found in southeastern Utah. These toads are very susceptible to pesticides.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Hylidae canyon treefrog Hyla arenicolor		Indigenous		L												C	C	C	C	C
	k	Wasatch Plateau	These insectivorous, nongame frogs inhabit canyons of the cold desert and submontane zones. Although primarily nocturnal, the frogs can be seen and heard during the day. Breeding peaks in May and June at perennial waters with rocky substrate. Pools of 3.0 foot depth or greater are most commonly utilized. Rainfall stimulates breeding activity. Eggs appear to do best in water temperatures of 59-84°F. Metamorphosed individuals begin to appear in early July after a 40-75 day larval period. This species is active from April through September.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
striped chorus frog Pseudacris triseriata		Indigenous		L												C	C	C	C	C
	c	Wasatch Plateau	These nongame frogs inhabit submontane and montane zones. They are insectivorous. Breeding occurs from February-June at vegetated perennial water sources. Metamorphosis occurs after 41-59 days. Optimum water temperatures for eggs and larvae are 70-75°F. Adults prefer water temperatures of 86-96°F. Occupied ponds contain abundant vegetation, have pH values between 4.8 and 7.8, and dissolved oxygen concentrations of 2.4 to 11.7 ppm. The Boreal subspecies (P.t. maculata) inhabits southeastern Utah.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ranidae *Bullfrog Rana catesbeiana		Exotic	L													C	C	C	C	C
	k	Wasatch Plateau	These game frogs inhabit the cold desert zone along the Colorado and Dolores Rivers. They are nocturnal and carnivorous. Breeding occurs from late spring to mid summer in 1.5 to 5.0 feet deep pools or slow moving waters of 68-86°F. Air temperatures above 77°F. and pH above 4.3 are necessary for successful reproduction. Shallow water is utilized by larvae although deep water is critical for overwintering. Metamorphosis usually lasts a year or more. Insecticides and channelization have been shown to have adverse affects on populations.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	l	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		
northern leopard frog Rana pipiens		Indigenous	L													C	C	C	C	C
	c	Wasatch Plateau	These nongame frogs inhabit all elevations. They are insectivorous and primarily nocturnal. Breeding occurs in clear, still, vegetated, perennial waters beginning in mid-March. Average water temperatures during this period are 50-64°F. Eggs are deposited on vegetation at depths of 6 inches and hatch after 4-15 days. Metamorphosis occurs from July-September consisting of 58-105 day larval period. These frogs do not do well in areas populated with fish and bullfrogs.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Amphibian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*spotted frog Rana pretiosa		Indigenous		L												C	C	C	C	C
	t	Wasatch Plateau	These nongame frogs inhabit submontane and montane zones. They are insectivorous and diurnal. Breeding occurs from mid-February through August in permanent cold water pools which lack emergent vegetation. Males reach sexual maturity after 1-2 years and females after 2-3 years. They are considered to be state listed, threatened animals. Without proper management, they may soon become federally listed as threatened. Most likely, no populations persist on the east side of the Wasatch Plateau. However, they are present on the west side.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

SOUTHEASTERN UTAH'S REPTILES

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Southeastern Utah's Reptiles (Reptilian Species)

There are 36 species of reptiles inhabiting southeastern Utah. All are native and it is believed that these same species were present at the time of settlement (1847). Nine species have become rare, although sufficient numbers exist for survival. Proper planning and management should keep any reptile species from being jeopardized.

The distribution of reptiles spans all ecosystems of southeastern Utah, but is concentrated in the sagebrush/grass, mountain brush, pinyon juniper, blackbrush, and grassland ecosystems of desert and submontane ecological associations. Riparian areas of all elevations are also utilized by a large number of species (Table 3).

Unlike the naked amphibian skin, reptilian skin is covered by scales composed of keratin deposits. There is also a distinct reduction in the presence of secretory glands. These factors combine to create a skin covering that is more impervious to body fluids than amphibian skin. Reptiles are thus able to inhabit drier ecosystems without the continuous requirement of immediate water sources. Wetland areas are, however, critical to many reptilian species in providing moist soil for egg deposition. Reptile eggs require a humid microenvironment to prevent desiccation.

Deep, loose soil is an important habitat component for reptiles. In addition to depositing eggs in the soil, burrows are excavated for shelter and hibernation. Reptiles rely heavily on the temperature of their environment for maintenance of body temperature. Open areas and rocks are used for basking in the sun.

Activity times are directly correlated with body temperature regulation. Many species are crepuscular (morning and evening twilight hours) or nocturnal (nighttime) and are inactive during warmer daytime temperatures. Diurnal (daytime) species are generally active only in the morning or late afternoon. When temperatures exceed the preferred range, they

Table 3. Numbers (#) of reptilian species that now (1990) inhabit geographic areas and the proportion (%) of that total which inhabit each ecosystem by ecological association within southeastern Utah.

Proportion (%) of species that inhabit each ecosystem by (1) Cold Desert (3,700–5,800 ft.); (2) Submontane (5,500–8,500 ft.); and (3) Montane (6,500–12,721 ft.) ecological associations.

UPLANDS

Geographic Areas (Elevation in feet)/#	URBAN 1	URBAN 2	URBAN 3	AGRICULTURAL 1	AGRICULTURAL 2	AGRICULTURAL 3	ALPINE 1	ALPINE 2	ALPINE 3	SPRUCE/FIR 1	SPRUCE/FIR 2	SPRUCE/FIR 3	ASPEN 1	ASPEN 2	ASPEN 3	PONDEROSA 1	PONDEROSA 2	PONDEROSA 3
Wasatch Plateau (5,500–10,741)/17		18	18		59				0			47			53			71
Tavaputs Plateau (5,500–10,118)/18					50							28			33			50
Cedar Mountain (5,500–7,664)/14																		
Henry Mountains (5,500–11,506)/18					44				0			11			17			33
Abajo/Elk Ridge (5,500–11,362)/23		9			56				0			22			26			30
LaSal Mountains (5,500–12,721)/22		4			6				0			23			27			41
Dolores Triangle (3,937–7,428)/17				47	47													
San Rafael Desert (4,120–7,920)/18	11	11		50	50													
Burr Desert (4,500–6,522)/17	6			41														
Cisco Desert (3,937–5,300)/18	6			50														
Canyonlands (3,700–10,388)/31	6	6		48	48							19			22			35

Geographic Areas (Elevation in feet)/#	SAGEBRUSH/GRASS 1	SAGEBRUSH/GRASS 2	SAGEBRUSH/GRASS 3	MOUNTAIN BRUSH 1	MOUNTAIN BRUSH 2	MOUNTAIN BRUSH 3	PINYON/JUNIPER 1	PINYON/JUNIPER 2	PINYON/JUNIPER 3	SALTBUSH/GRASS 1	SALTBUSH/GRASS 2	SALTBUSH/GRASS 3	BLACKBRUSH 1	BLACKBRUSH 2	BLACKBRUSH 3	GRASSLAND 1	GRASSLAND 2	GRASSLAND 3	BARREN 1	BARREN 2	BARREN 3
Wasatch Plateau (5,500–10,741)/17		88	65		88			82									76	53		53	35
Tavaputs Plateau (5,500–10,118)/18		94	50		94			89									89	44		67	17
Cedar Mountain (5,500–7,664)/14		100			93			93									93			86	
Henry Mountains (5,500–11,506)/18		100	39		94			94						100			94	33		83	28
Abajo/Elk Ridge (5,500–11,362)/23		96	43		91			91						96			91	39		70	26
LaSal Mountains (5,500–12,721)/22		91	41		91			91						91			86	36		59	23
Dolores Triangle (3,937–7,428)/17	94	94			94			94		94			94	94		88	88		70	70	
San Rafael Desert (4,120–7,920)/18	94	94			89			89		100			100	94		94	89		83	78	
Burr Desert (4,500–6,522)/17	94	88			82			82		100			100	88		94	82		94	82	
Cisco Desert (3,937–5,300)/18	94									94						89			72		
Canyonlands (3,700–10,388)/31	80	80	35		77			77		84			87	81		87	77	29	71	64	19

WETLANDS

Geographic Areas (Elevation in feet)/#	MARSH 1	MARSH 2	MARSH 3	MESIC MEADOW 1	MESIC MEADOW 2	MESIC MEADOW 3	RIPARIAN 1	RIPARIAN 2	RIPARIAN 3	STREAM 1	STREAM 2	STREAM 3	LAKE 1	LAKE 2	LAKE 3
Wasatch Plateau (5,500–10,741)/17		12	12		24	24		94	76		12	12		12	12
Tavaputs Plateau (5,500–10,118)/18		6	6		17	17		83	56		6	6		6	6
Cedar Mountain (5,500–7,664)/14		7			7			71			7			7	
Henry Mountains (5,500–11,506)/18		11	6		11	6		78	39		6	6		6	6
Abajo/Elk Ridge (5,500–11,362)/23		9	4		17	13		74	48		4	4		4	4
LaSal Mountains (5,500–12,721)/22		9	4		18	14		82	50		4	4		4	4
Dolores Triangle (3,937–7,428)/17	6	6		6	6		76	76		6	6		6	6	
San Rafael Desert (4,120–7,920)/18	6	6		6	6		78	78		6	6		6	6	
Burr Desert (4,500–6,522)/17	6	6		6	6		71	71		6	6		6	6	
Cisco Desert (3,937–5,300)/18	6			6			78			6			6		
Canyonlands (3,700–10,388)/31	6	6	3	13	13	10	68	71	42	3	3	3	3	3	3

seek cover in burrows or under rocks. Cold weather also tends to promote inactive periods.

It is important for land use planners and biologists to realize the occurrence of active and inactive periods for these species. Life requisite information in this section identifies activity temperatures and months for most species.

As with all wildlife, crucial breeding seasons and critical habitats are factors of immense importance when considering potential impacts of a project. This information has been carefully outlined in the narratives.

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
			Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
short-horned lizard *Phrynosoma douglassii*		Indigenous				S	S	S	S	S	S	S	S	S	C					S
	c	Wasatch Plateau	These nongame lizards inhabit all elevations. Sparsely vegetated sandy or rocky soil provides preferred habitat, but the soil must be loose enough and deep enough to provide overwintering. They are carnivorous and diurnal. They are active from April to October at an average air temperature of 79°F. Breeding occurs in late spring. A single live-birth of 6-31 young occurs between July and August.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
desert horned lizard *Phrynosoma platyrhinos*		Indigenous							S			S	S	S	C					
	k	Wasatch Plateau	These carnivorous nongame lizards inhabit cold desert and submontane zones. Preferred habitat consists of flats, washes, and valleys dominated by shrubs. Diurnal activity occurs at air temperatures of 95-111°F. Breeding occurs in April and May, and 2-10 eggs are laid. Two clutches may be laid in one year followed by none the next year. The southern subspecies (*P.p. calidiarum*) inhabits southeastern Utah. It is restricted to the Navajo Indian Nation south of the San Juan River and Lake Powell, although suitable habitat exists to the north.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*common chuckwalla *Sauromalus obesus*		Indigenous										S		S	C					
	k	Wasatch Plateau	These herbivorous nongame lizards inhabit cold desert zones. Rocky outcrops are essential in providing crevices for the lizards. They are active diurnally from March-August at air temperatures of 95-104°F. Breeding occurs every second year during May and June, after which 5 to 10 eggs are laid. The Glen Canyon subspecies (*S.o. multiforaminatus*) inhabits Lake Powell. Its population may be disappearing due to intense recreational use. Therefore, it is considered a sensitive species.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
sagebrush lizard *Sceloporus graciosus*		Indigenous	S	H	S	S	L	L		C					L					
	c	Wasatch Plateau	These insectivorous nongame lizards inhabit cold desert, submontane, and montane zones. This species is diurnally active at air temperatures between 86°F and 95°F. Deep soil or rock crevices are important in providing shade and hibernation areas. Breeding occurs in moist soil from June-July. Two to seven eggs are laid, and hatching occurs in July and August. Only the northern subspecies (*S.g. graciosus*) inhabits southeastern Utah.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
desert spiny lizard *Sceloporus magister*		Indigenous	S	S	S	S	S	S	C						C					
	k	Wasatch Plateau	These nongame lizards inhabit cold desert and submontane zones. They are omnivorous and diurnally active at air temperatures of 86-91°F. They use a variety of logs, rocks, debris, and burrows for shelter. Availability of shelter and vegetation seems to determine densities of the lizards in an area. Breeding occurs from April-June, after which 7-19 eggs are laid. Incubation lasts 8-11 weeks. A second clutch may be laid. Only the orange-headed subspecies (*S.m. cephaloflavus*) inhabits southeastern Utah.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	l	Henry Mountains																		
	l	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	l	San Rafael Desert																		
	l	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		
eastern fence lizard *Sceloporus undulatus*		Indigenous	H	S	H	L	L	S	C											
	c	Wasatch Plateau	These nongame insectivorous lizards inhabit cold desert and submontane zones. They require rocky, deep soil areas with openings to allow basking. Diurnal activity occurs at an average air temperature of 76°F. Breeding occurs from April-August, after which 3-13 eggs are laid in moist soil. Yearlings deposit only 1 clutch, while adults deposit 2-4 clutches. Eggs incubate for 2 months. Only the northern plateau subspecies (*S.u. elongatus*) inhabits southeastern Utah.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands Marsh	Mesic Meadow	Riparian	Stream	Lake
			Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
tree lizard *Urosaurus ornatus*		Indigenous	S	L	C	C	L	L	L	C								C		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
side-blotched lizard *Uta stansburiana*		Indigenous	S	L	S	S	S	H	C									S		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

These nongame lizards inhabit cold desert, submontane, and montane zones. They are insectivorous and diurnal. Rocky areas are required for shelter, nesting sites, and feeding areas. Scattered pinyon-juniper stands are also critical for feeding. Breeding occurs in May and June with as many as 6 clutches of 3-13 eggs deposited. Eggs hatch after 2 1/2 months. Only the northern subspecies (U.o. wrighti) inhabits southeastern Utah.

These insectivorous nongame lizards inhabit arid and semi-arid open shrublands of cold desert and submontane zones. They are diurnally active from May-October at air temperatures of 68-84°F. Breeding begins by April and the young appear in late July or August after an incubation period of 60-100 days. Three clutches of 2-6 eggs are laid in moist soil. The validity of subspecies classification is uncertain.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
western skink Eumeces skiltonianus		Indigenous							H	H	H			S	C					H
	k	Wasatch Plateau	These nongame lizards inhabit submontane zones. Although found in drier areas, they prefer rocky, well-vegetated areas by streams. This secretive species is insectivorous and diurnal, active at air temperatures of 87-93°F. They remain fossorial during dry months. Breeding occurs from May to June, after which 2 to 6 eggs are laid. Females tend the eggs and hatching occurs from July to August. Only the Great Basin subspecies (E.s. utahensis) inhabits southeastern Utah. It is restricted to the Tavaputs Plateau.																	
	l	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Boidae rubber boa Charina bottae		Indigenous							S	S	S	L	S			S			S	H
	u	Wasatch Plateau	These carnivorous nongame snakes inhabit submontane and montane zones. They are subterranean reptiles that are active when air temperatures are 68-88°F. Streamside meadows and forests with numerous rotting logs provide preferred habitat. Live birth occurs as a single event for 1 to 8 young in late August or September. Due to this boa's docile behavior and survivability in captivity, unlawful commercialization could challenge the species' safety. Only the Rocky Mountain subspecies (C.b. utahensis) inhabits southeastern Utah.																	
	u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Colubridae *glossy snake Arizona elegans		Indigenous							S	S	S	S	S	S	C					
	k	Wasatch Plateau	These nongame snakes inhabit open areas of cold desert and submontane zones. The species is normally active when air temperatures range from 66-95°F; 80°F provides optimum temperature. They are carnivorous and subterranean. Breeding occurs in the spring and eggs hatch 10 to 12 weeks later. The young become active by September. Only the Painted Desert subspecies (A.e. philipi) inhabits southeastern Utah. It is restricted to the Navajo Indian Nation south of the San Juan River and Lake Powell. It is sensitive to human disturbance.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
racer Coluber constrictor		Indigenous	S						H	H	H	S	S	H	C				H	
	u	Wasatch Plateau	These carnivorous nongame snakes inhabit cold desert and submontane zones. Mating occurs from April to June. Laying of a 5-28 egg clutch occurs from mid-June through August, after which young hatch in 6-8 weeks. Availability of rocks or burrows for nesting is a limiting factor. Racers den in large numbers along with other species. They are active at an average body temperature of 89°F or when air temperatures are between 68°F and 93°F. Only the western yellow-bellied subspecies (C.c. mormon) inhabits southeastern Utah.																	
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
ring-neck snake Diadophis punctatus		Indigenous	L	L		H	H	H												C
	u	Wasatch Plateau	These carnivorous nongame snakes inhabit moist areas of cold desert, submontane, and montane zones. Mating occurs in the spring and fall. In June and July, 1-10 eggs are laid in communal nest sites under logs, rocks, or in burrows. They hatch in 8 weeks. These secretive snakes are seldom seen in the open. Activity generally occurs when air temperatures are 69-88°F. The regal subspecies (D.p. regalis) inhabits southeastern Utah.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
*corn snake Elaphe guttata		Indigenous		H		H	H	H		S	S									C
	k	Wasatch Plateau	These nongame snakes inhabit all elevations. They are carnivorous and primarily nocturnal, active from March through September. Mating occurs from March through May. A clutch of 3 to 21 eggs is laid in moist soil from July through September. Eggs in captivity have been reported to hatch in 54-97 days. Only the Great Plains rat subspecies (E.g. emoryi) inhabits southeastern Utah. Insufficient data exists to fully support a position on status for this species.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		
	u																			

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
night snake Hypsiglena torquata	c c c c c c c c c c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	L						H	H	H	H	H	H	H					H
These nongame snakes inhabit cold desert and submontane zones. Their preference is for rocky, pinyon/juniper slopes, although they have been found in grasslands without rocks. They are carnivorous, secretive, and nocturnal. They appear to be most active from May through October at air temperatures of 86°F to 93°F. Little is known about breeding, but a clutch of 4-6 eggs is laid between April and July. Hatching occurs 7-8 weeks later. The night snake's saliva is mildly toxic.																				
*common kingsnake Lampropeltis getulus	k k k r r r k k k k r	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	H			S	S	S	S	S	S	S			S	H	C			
These nongame snakes inhabit all elevation zones. They are often at vegetated rocky outcrops or under old logs. They are carnivorous and primarily diurnal. Breeding occurs from mid March into June. A clutch of 3 to 24 eggs is laid between mid May and August. hatching occurs 8 to 12 weeks later. These animals are unlawfully commercialized due to their attractiveness as pets. The California subspecies (L.g. californiae) may inhabit the Henry Mountains and environs south of the San Juan River. It is a sensitive species.																				

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Sonoran mountain kingsnake *Lampropeltis pyromelana*		Indigenous					H	H	H	H	H	H						C		
	r	Wasatch Plateau	These nongame snakes inhabit submontane and montane zones. Rocky, well vegetated areas near water are preferred. They are carnivorous and primarily subterranean. Nocturnal activity is known. Breeding occurs in the spring. A clutch of up to 17 eggs is laid in rotten logs during June and July. Hatching occurs 2.5 to 3 months later. Due to their beauty and qualities as a pet, they are unlawfully commercialized. Only the Utah mountain subspecies (*L.p. infralabialis*) inhabits southeastern Utah. It is a sensitive species.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
*milk snake *Lampropeltis triangulum*		Indigenous	S		S	H	H	H	H	H	H	H	H					C		
	r	Wasatch Plateau	These nongame snakes inhabit cold desert, submontane, and montane zones. They are carnivorous and primarily subterranean. Nocturnal activity is known. Breeding occurs during the spring. A clutch averaging 7 eggs is laid in June or July. Incubation lasts 65 to 85 days. Due to their beauty and desirability as a pet, they are unlawfully commercialized. Only the Utah subspecies (*L.t taylori*) inhabits southeastern Utah. It is a sensitive species.																	
	r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	r	San Rafael Desert																		
	r	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
	r																			

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
coachwhip Masticophis flagellum		Indigenous		S					H	H	H	H	H	H	C					C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		
		These nongame snakes inhabit cold desert and submontane zones. Burrows and rock crevices are used for shelter. They are carnivorous and diurnal, maintaining average body temperatures of 89°F. They are active from April through September. Breeding occurs in the spring. A clutch of 4-16 eggs is laid in June or July. A depth of at least one foot of moist, loose soil is necessary for nesting. Incubation lasts 6-11 weeks. Only the red subspecies (M.f. piceus) inhabits southeastern Utah.																		
striped whipsnake Masticophis taeniatus		Indigenous		L				S	S	H	H	S	S	L	C					C
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
		These carnivorous nongame snakes inhabit cold desert, submontane, and montane zones. They are diurnal snakes, maintaining average body temperatures of 89°F. Breeding occurs in late April and May. A clutch of 3-12 eggs is laid during June and July in abandoned rodent burrows. Hatching occurs in August after a 44-50 day incubation period. Degradation of riparian areas represents a substantial impact to this snake. Only the desert subspecies (M.t. taeniatus) inhabits southeastern Utah.																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*smooth green snake *Opheodrys vernalis*		Indigenous		H													C	C		
	u	Wasatch Plateau	These insectivorous snakes are diurnally active at all elevations from April-September. They prefer areas abundant with ground debris and humus. Breeding occurs in May and June. A clutch of 3-11 eggs is laid in July or August. Communal egg laying sites exist. Incubation lasts 4-23 days. Only the western subspecies (*O.v. blanchardi*) inhabits southeastern Utah, however, insufficient data on its status exists. Loss of habitat and pesticide use are harmful to these snakes.																	
	u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		
pine snake *Pituophis melanoleucus*		Indigenous		H		S	S	S	H	H	H	H	H	H	C				H	
	c	Wasatch Plateau	These nongame snakes inhabit open areas of cold desert, submontane, and montane zones. They are carnivorous and primarily diurnal, although nocturnal activity is common in hot weather. The species is active at air temperatures of 61-91. Breeding occurs in the spring. A clutch of 3 to 24 eggs is laid between June and August. Incubation lasts 64 to 79 days. The Great Basin subspecies (*P.m. deserticola*) is found throughout southeastern Utah.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

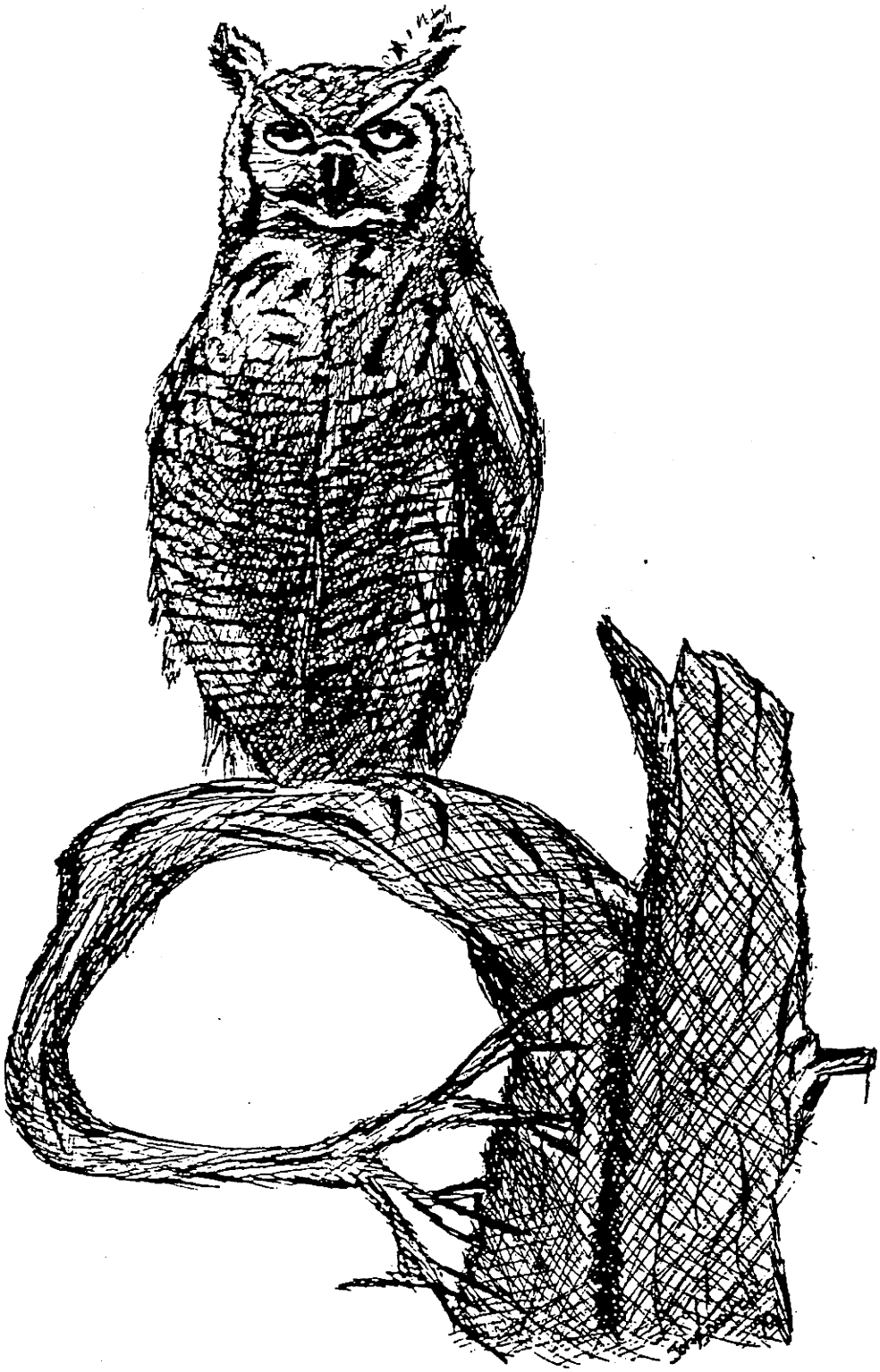
Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
black-necked garter snake Thamnophis cyrtopsis		Indigenous	L		S	H	S	L	S	L	L	L	L				H	C		
	k	Wasatch Plateau	These nongame snakes inhabit cold desert, submontane and montane zones. They require deep soil for shelter in the winter. They are carnivorous and diurnal. Activity occurs from March through November at temperatures between 60°F and 95°F. A single live birthing incident of 7-25 young occurs between late June and August. The western subspecies (T.c. cyrtopsis) inhabits southeastern Utah.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		
western terrestrial garter snake Thamnophis elegans		Indigenous	L	H		S	S	S	S	S	L	L	L	S		C	C	C	H	H
	c	Wasatch Plateau	These carnivorous nongame snakes inhabit all elevations. At lower elevations, they are diurnally active from March through November at air temperatures of 53°F to 86°F. Garter snakes are dependent upon ecosystems near aquatic habitats. Breeding occurs in the spring. A single live birthing event of 4-19 young occurs between July and September. Garter snakes hibernate in rodent burrows or beneath rocks. The wandering subspecies (T.e. vagrans) inhabits southeastern Utah.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Reptilian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
common garter snake *Thamnophis sirtalis*		Indigenous	L	H		S	S	S	S	S	L	L	L	S	C	C	C	C	H	H
	c	Wasatch Plateau	These nongame snakes inhabit all elevations. They are carnivorous and diurnal. Garter snakes are terrestrial, but dependent upon ecosystems near aquatic habitats. They bask on the ground or emergent vegetation. Breeding occurs in the spring soon after emergence from the hibernaculum. Live birth of 14-15 young occurs between late June and early fall after a 3-4 month gestation period. Large numbers hibernate together. The valley subspecies (*T.s. fitchi*) inhabits the Wasatch Plateau.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Viperidae western rattlesnake (*Crotalus viridis*)		Indigenous		H			L	L	S	S	S	S	S	S	C					L
	c	Wasatch Plateau	These nongame carnivorous snakes inhabit all elevations. Activity hours are dependent upon temperature. Live birth of 4-21 young occurs in the fall after a 3-4 month gestation period. They hibernate with their own and other species. The prairie (*C.v. viridis*) and Hopi (*C.v. nuntius*) subspecies are found in Grand and San Juan Counties. The midget faded subspecies (*C.v. concolor*) is found throughout southeastern utah. The Great Basin subspecies (*C.v. lutosus*) is found on the Wasatch Plateau.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

SOUTHEASTERN UTAH'S BIRDS



Southeastern Utah's birds (Avian Species)

At the time of Utah's settlement (1847) 280 avian species inhabited the region. Today 285 avian species inhabit southeastern Utah. Seven exotics have established populations. Unfortunately, other native species have not fared as well. The passenger pigeon (Ectopistes migratorius) has become extinct. Four other species -- California condor (Gymnogyps californianus), peregrine falcon (Peregrinus anatum), bald eagle (Italiaertus leucocephalus), and whooping crane (Grus americana) -- have become endangered with extinction. The California condor is extirpated from the region. Population levels of another 19 species have been jeopardized such that they are classed as rare, although they still occur in numbers adequate for survival. Market hunting was the cause for the demise of passenger pigeons. Habitat losses, environmental pollutants, and disturbances by man have spelled "doom" for the other birds that are in jeopardy. Only planning followed by solid management decisions can retrieve these birds from peril and keep others from being jeopardized.

Pesticide use can have severe impacts on bird populations. The heavily publicized DDT (a chlorinated hydrocarbon) decimated many bird populations. Chlorinated hydrocarbons are persistent and tend to "bioconcentrate" at each level of the food chain. Raptors and other species at the top of the food chains are the most negatively affected by these pesticides. The birds are not immediately impacted by ingestion of the compound. However, DDT alters calcium metabolism of adult birds, causing thinning of egg shells to the point of embryo mortality. DDT was banned in 1972 which helped many bird populations recover. Unfortunately, pesticide problems still occur. Organophosphate pesticides, although they do not bioconcentrate, are highly toxic. Mercury, which is toxic to birds when ingested, is also used as an ingredient in some pesticides. DDT is present again as an ingredient in Docofol, a toxin used in many pesticides.

Bioconcentration of selenium through the food chain can also impact bird populations. Selenium is an essential micronutrient to all animals. However, 3-8 ppm dry weight of

Table 4. Numbers (#) of avain (bird) species that now (1990) inhabit geographic areas and the proportion (%) of that total which inhabit each ecosystem by ecological association within southeastern Utah.

Geographic Areas (Elevation in feet)/#	Proportion (%) of species that inhabit each ecosystem by (1) Cold Desert (3,700–5,800 ft.); (2) Submontane (5,500–8,500 ft.); and (3) Montane (6,500–12,721 ft.) ecological associations.																																															
	UPLANDS																																							WETLANDS								
	URBAN			AGRICULTURAL			ALPINE			SPRUCE/FIR			ASPEN			PONDEROSA			SAGEBRUSH/GRASS			MOUNTAIN BRUSH			PINYON/JUNIPER			SALTBUSH/GRASS			BLACKBRUSH			GRASSLAND			BARREN			MARSH			MESIC MEADOW			RIPARIAN			STREAM			LAKE		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Wasatch Plateau (5,500–10,741)/231		40	24		46				9			31			30			32		31	19		38			41										22	15		10	7		47	35		31	27		88	65		32	27		32	28
Tavaputs Plateau (5,500–10,118)/232					46							31			29			32		31	18		37			40										22	15		9	6		49	35		32	27		90	65		32	27		33	28
Cedar Mountain (5,500–7,664)/111																				52			60			65										39			17			28			19			96			5			5	
Henry Mountains (5,500–11,506)/217					47				10			35			34			37		34	20		43			46							17			23	15		11	7		41	31		32	33		88	67		31	24		27	24
Abajo/Elk Ridge (5,500–11,362)/225		38			47				9			34			32			35		33	20		41			45							16			23	14		12	8		42	32		31	28		89	68		27	25		28	23
LaSal Mountains (5,500–12,721)/228		38			47				9			33			32			35		32	19		41			44							15			23	14		11	7		42	32		31	27		89	67		27	29		28	25
Dolores Triangle (3,937–7,428)/239				39	46														26	32			37			40		21			19	16		25	24		10	10		49	46		34	32		74	87		34	31		35	32	
San Rafael Desert (4,120–7,920)/232	30	34		41	45														27	31			34			39		21			20	17		25	24		10	10		51	46		35	32		76	85		36	33		36	33	
Burr Desert (4,500–6,522)/173	39			49															35	39			43			53		30			28	23		32	28		14	13		39	31		27	22		72	87		21	16		21	16	
Cisco Desert (3,937–5,300)/102	58			85															54									46						51			22			44			22			85			7			7		
Canyonlands (3,700–10,388)/258	27	34		44	43							29			27			30	25	30	19		36			40		20			18	15		24	22	12	10	10	7	46	43	31	31	29	47	64	83	58	31	29	24	31	29	25

selenium in food has been shown to cause embryo deformities and inhibit reproductive success in waterfowl. A selenium concentration of 30 ppm in livers of waterfowl produces reproductive abnormalities. Selenium is a naturally-occurring element, primarily associated with marine shales. Problems arise when irrigation practices leach selenium at high concentrations from the soil allowing it to enter the food chain. Recovery time of aquatic systems contaminated with selenium appears variable and site specific. Utah regulations stipulate that concentration levels in water less than 20 ppb (1 hour average) or 5 ppb (4 day average) be achieved.

Botulism is another impact on wetland bird populations, that results from pool water quality parameters. It is a bacterium that affects the nervous system and causes death. Water bodies with high temperatures, low water levels, low oxygen levels, and high alkalinity are frequent sites of botulism outbreaks.

Alterations to water quality and quantity can impact fish and other aquatic populations that provide food sources for many bird species. The availability of good drinking water is critical for all species.

Toxins from oil spills can be inhaled or ingested by birds. Resultant viral infections, kidney damage, or liver damage can cause mortality. The toxins are also easily absorbed through egg shells, resulting in the death of the embryo. Oil can become matted on feathers and reduce both the insulating and buoyancy capacity of the feathers. Residue from some evaporation ponds may collect on bird feathers with the same effect.

The loss or disturbance to habitat can reduce bird populations. Vegetation destruction can reduce forage availability, nesting sites, and cover. During crucial periods such as breeding, wintering, and migrating, the importance of adequate habitat is magnified. Nesting birds are particularly vulnerable to disturbance and many will desert their nest site. Of those species that desert, some tend to renest while others will not. Raptor nests require anywhere from 0.5 to 1.0 mile radius protected from human disturbance for

successful reproduction. The impacts to populations of birds whose breeding activities were thwarted are obvious. It is important to realize that breeding can only be considered successful if the nestlings survive through fledging and ultimately reproduce.

While each ecosystem is important to those bird species inhabiting it, there is substantial variation in use of ecosystems within a geographic area (Table 4). Riparian areas, regardless of geographic area, are the most heavily utilized habitat by birds in southeastern Utah; 58% to 96% of the bird species for any area utilize this setting. Riparian ecosystems serve as important migration corridors or simply stopover sites. They also provide excellent quality breeding habitat. The desert and submontane elevations of the riparian areas tend to attract more species than montane elevations. This is in part due to the ability of desert and submontane areas to support more species in winter when higher montane elevations are subject to adverse conditions (Table 4).

Agricultural ecosystems can be important due to water supplied by irrigation activities and the abundance of food from crops. This is particularly evident in the Cisco Desert where 85% of the birds that utilize the area frequent farmlands. Riparian ecosystems here also support 85% of the species. The Cisco Desert is rather inhospitable for many wildlife species, thus the high concentration of birds in areas with water (Table 4).

The following species' specific narratives address critical valued use areas and crucial time periods for individual species of birds; nesting times and sites, incubation times, and nestling periods were included for each species as well as forage preferences. Note that the diet described in each narrative pertains to the food category most utilized by the birds; herbivorous, carnivorous, omnivorous, and insectivorous. Yearly food requirements include proteins, fats, carbohydrates, vitamins, and minerals. Nitrogen (derived from proteins) is important to avian life cycles, particularly during reproduction, growth, and molting. Birds will increase their intake of animal food to meet this need. Even species that are normally herbivorous will incorporate insects in their diet. Nestlings also require

diets with an abundance of insects. Project Plannors should give consideration to the specific requirements for birds.

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Gaviidae Arctic loon Gavia arctica		Indigenous																C	C	
	Tr/a	Wasatch Plateau	These nongame birds frequent large bodies of water at all elevations but seem to prefer cold lakes. They feed on fish. They have been observed at Scofield Reservoir during migration. One specimen was collected as an injured bird in Wellington, Utah, during the fall of 1987.																
	k	Tavaputs Plateau																	
	k	Cedar Mountain																	
	k	Henry Mountains																	
	k	Abajo/Elk Ridge																	
	k	LaSal Mountains																	
	k	Dolores Triangle																	
	Tr/a	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	k	Canyonlands																	
common loon Gavia immer		Indigenous															C	C	C	C
	Tr/u	Wasatch Plateau	These nongame birds frequent large bodies of water at any elevation. They feed on fish. Siltation, oil, pollution, and other human disturbances can be harmful. Both sexes incubate the eggs for 26-31 days, followed by a 75-80 day nestling period. Nests are formed from debris and are build adjacent to water. Although considered a transient species, one pair is believed to have nested on Scofield Reservoir in 1987.																
	Tr/u	Tavaputs Plateau																	
	k	Cedar Mountain																	
	k	Henry Mountains																	
	k	Abajo/Elk Ridge																	
	Tr/u	LaSal Mountains																	
	Tr/u	Dolores Triangle																	
	Tr/u	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	Tr/u	Canyonlands																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Podicipediae *western grebe Aechmophorus occidentalis		Indigenous														C		C	C	C
	Tr/o	Wasatch Plateau	These nongame birds frequent water bodies at any elevation where they can forage for small fish and aquatic invertebrates. Little is known concerning population dynamics and insufficient data exists to fully support a position on their status. Spring migrants arrive in mid March. Colonial nesting occurs in June with a 28 day incubation period. Young fledge at 63-77 days of age. Stable water levels with dense emergent vegetation are important since the nest is a floating mat of vegetation. Migrants depart by mid November.																	
	Tr/o	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/l	Canyonlands																		
horned grebe Podiceps auritus		Indigenous														C		C	C	C
	Su/u	Wasatch Plateau	These nongame birds frequent water bodies at any elevation where they can forage for small fish and aquatic invertebrates. High turbidity can limit feeding success. Their population trend is believed to be stable. Spring migrants arrive in March. Nesting occurs in June with a 28 day incubation period. Young fledge in 45-60 days. The nest is a floating mat of vegetation, so stable water levels are important. This species winters in coastal areas. Fall migrants leave Utah by late October.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
eared grebe Podiceps nigricollis		Indigenous														C		C	C	C
	Su/u	Wasatch Plateau	These nongame birds frequent water bodies at all elevations where they can feed on fish and aquatic invertebrates. Their population trend is believed to be stable. Spring migrants arrive in large flocks during March. Colonial nesting occurs in June with a 3-4 week incubation period and a 3 week nestling period. Nests are constructed as floating mats of vegetation, so stable, shallow water conditions are critical. Migrants depart Utah by mid November.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
pied-billed grebe Podilymbus podiceps		Indigenous														C		C	C	C
	Su/c	Wasatch Plateau	These nongame birds frequent clear, slow-moving water bodies at all elevations. They feed on fish and aquatic invertebrates. Their population trend is stable. Breeding occurs from March-August. Nesting usually occurs in June with a 28 day incubation period. Young are fairly independent at 3 weeks of age. The nest is a floating structure anchored either to emergent vegetation or to the bottom. Fall migrants leave when their use areas freeze out. These birds are sensitive to human disturbances.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational; scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Pelecanidae *American white pelican Pelecanus erythrorhynchos		Indigenous														C		C	C	C
	Tr/r	Wasatch Plateau	The population trend of these nongame birds is stable. They are restricted to large bodies of water at all elevations. Nests are constructed on the ground or in bulrushes beginning in March. Eggs are incubated for 29-36 days. Young have fledged by August. Migration out of Utah is complete by mid October. Pelicans feed primarily on fish at shallow water fishing grounds. Only non-breeding groups are known to frequent southeastern Utah.																	
	Tr/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		
Family: Phalacrocoracidae *double-crested cormorant Phalacrocorax auritus		Indigenous														C		C	C	C
	Tr/r	Wasatch Plateau	These nongame birds occur at all elevations. Their population trend in unknown. Cormorants appear to favor large reservoirs for feeding and brooding. Nests can be located on the ground, on islands, or in trees surrounded by water. The birds arrive in Utah in March and remain until the end of November with colonial nesting occurring from April-July. There is a 25-29 day incubation period and the young fledge in another 35-42 days. These birds dive for fish and crustaceans.																	
	Tr/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ardeidae		Indigenous														C	H	C	C	C
*great blue heron Ardea herodias	Su/u Su/u k k k k Su/u Su/u Su/u k Su/u	Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	These nongame birds occur at desert and submontane elevations. Their population trend is unknown. Heronry sties are preferably located in trees near water, but herons have also been known to nest on the ground. The crucial period for nesting and brooding is from March to mid September. Nests will be abandoned if the site is disturbed. Heronries are reused each year. Eggs are incubated for 28 days and the young fledge at 55-60 days of age. Fish are the primary food. Herons must be undisturbed at their forage areas.																	
*American bittern Botaurus lentiginosus	k Su/u k k k k Su/u Su/u k k Su/u	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	These nongame birds are dependent upon dense wetlands at desert and submontane elevations. They are found in southeastern Utah from April through November. These shy birds are solitary and nocturnal. Their population trend appears stable. Nests are platforms of vegetation built above water and occur from May-July. Eggs are incubated for 28-29 days and the young remain in the nest an additional 2 weeks. Bitterns feed on fish, crayfish, aquatic vertebrates, and insects. The birds will desert both feeding and nesting sites if disturbed.													C		C		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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cattle egret *Bubulcus ibis*		Indigenous		C												C	C	C	C	C
	k	Wasatch Plateau																		
	Tr/o	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	Tr/o	Burr Desert																		
	k	Cisco Desert																		
	Tr/o	Canyonlands																		
			Cattle egrets pass through southeastern Utah enroute to Central and South America. This species is found at desert and submontane elevations. They are most likely observed from April through May or August through September. Their population trend is unknown. Cattle egrets are primarily insectivorous and are often associated with large grazing animals.																	
green-backed heron *Butorides striatus*		Indigenous														C		C	C	C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/o	Canyonlands																		
			These nongame herons frequent wetlands in desert zones. Their population trend is unknown. Herons eat fish, aquatic invertebrates, insects, and crayfish.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
snowy egret Egretta thula		Indigenous														C	C	C	C	C
	k	Wasatch Plateau	These nongame birds inhabit desert and submontane elevations. Their population trend is unknown. Snowy egrets prefer to nest at remote marshes in association with great blue and black-crowned night herons. They are intolerant of human disturbance and will desert their nests. Nests are platforms of sticks built in trees, shrubs, willows, and marsh grass from May-July. Eggs are incubated for 20-24 days and the young fledge at 30 days of age. High turbidity and dense vegetation can hinder the egret's ability to locate fish and insects.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
least bittern Ixobrychus exilis		Indigenous														C		C		
	k	Wasatch Plateau	Least bitterns inhabit herbaceous wetlands in the desert zone. The population trend of these birds is unknown, although their secretive habits may cause them to appear less numerous than records indicate. When alarmed, they run into vegetation instead of taking flight. Bitterns take fish, crayfish, aquatic invertebrates, and insects from small pools amidst dense vegetation.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*black-crowned night heron Nycticorax nycticorax		Indigenous														C		C	C	C
	Su/u	Wasatch Plateau	These nongame birds occur at desert and submontane elevations from mid April through October. Little is known about their population trend. Nesting occurs from May-July. Nests are loose platforms of sticks lined with grass. They are frequently built in trees and will be deserted if disturbed. There is a 24-26 day incubation period and 42-49 day nestling period. Night heron colonies are frequently situated amongst great blue herons and snowy egrets. Primary food sources are fish, aquatic invertebrates, insects, crayfish, and mollusks.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
Family: Threskiornithidae *white-faced ibis Plegadis chihi		Indigenous	C													C	C	C	C	C
	Tr/r	Wasatch Plateau	These nongame birds are highly valued by bird-watchers. They are found at desert and submontane elevations from May through September. Their population trend is unknown. Breeding and nesting are colonial and are often associated with herons. Most nesting occurs in June. Nests are cupped platforms of reeds in the marsh. Eggs are incubated for 21-22 days and the young fledge in another 28 days. These birds eat crustaceans, fish, worms, mollusks, and insects.																	
	Tr/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	Su/r	Burr Desert																		
	Su/r	Cisco Desert																		
	k	Canyonlands																		
	Tr/r																			

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2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ciconiidae		Indigenous														C		C	C	C
wood stork	k	Wasatch Plateau	Wood storks can be found at desert and submontane elevations. These nongame birds have been sighted in Utah after their breeding season, from late summer to early fall. Their population trend is unknown. Wood storks often soar in flocks at considerable heights. They eat fish, reptiles, amphibians, and rodents.																	
Mycteria americana	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Anatidae		Indigenous														C		C	C	C
*wood duck	Tr/u	Wasatch Plateau	These game birds are highly valued for aesthetic and economic values. They occur at all elevations during early spring and early fall migrations. Their population trend is unknown but is likely stable or increasing. They feed upon seeds, grapes, and berries.																	
Aix sponsa	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

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2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*northern pintail Anas acuta		Indigenous		C												C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
		Pintails are important game birds and show the widest range of all North American ducks. They are found at all elevations. The population trend of these shallow-water birds is decreasing. Pintails are early breeders and begin egg-laying in April. Broods hatch by June after a 22-25 day incubation period. Nestlings fledge after another 36-57 days. Nests are downy hollows usually built in uplands within 1 mile of water. These ducks often feed on vegetable matter in temporary pools.																		
*American wigeon Anas americana		Indigenous		C												C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k'	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
		These game birds inhabit all elevations. Their population trend is decreasing. Spring migration lasts from mid February to mid May, and fall migration occurs from early July to mid December. In late spring, nests are constructed on dry ground, generally away from water. Incubation lasts 24 or 25 days. Females are protective of their brood, which fledge after 37-48 days. American wigeons feed primarily on aquatic vegetation, and occasionally on grain and grass shoots.																		

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2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*northern shoveler Anas clypeata		Indigenous		S												C	C	C	S	C
	Su/c	Wasatch Plateau	These omnivorous game birds occur at all elevations. Their population trend is stable to slightly decreasing. Spring migration begins shortly after ice-out and lasts until March. Fall migration occurs from mid September through October. Nesting occurs from mid May to early August. Hollow nests are constructed on the ground and lined with grass, weeds, and down. Incubation lasts about 24 days and fledging occurs in another 38-66 days.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
*green-winged teal Anas crecca		Indigenous		S												C	C	C	C	C
	Su/c	Wasatch Plateau	Green-winged teal inhabit wetland ecosystems at all elevations. Their population trend is increasing. Migrants appear in large flocks from early March to mid April, and again from early September to early December. Nesting occurs in late spring. Nests are down-lined depressions located in the grass. Eggs incubate for 21-23 days, and fledging occurs at 34 days of age. Their diet is varied and includes aquatic invertebrates, tadpoles, grains, seeds, and grasses.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*cinnamon teal Anas cyanoptera		Indigenous		S												C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			Cinnamon teal are popular game birds. They are found at all elevations from mid March to December. Breeding occurs wherever there are suitable wetlands. Nests are lined with down and are preferably built in saltgrass. Nesting occurs from April-August. The female incubates the eggs for 21-25 days followed by a 49 day nestling period. Nests are sometimes lost to spring flooding. The population trend of these birds is stable.																	
*blue-winged teal Anas discors		Indigenous		S												C	C	C	C	C
	Su/u	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
			These game birds are found at all elevations. All wetlands provide suitable habitat, but nesting preferably occurs in semi-permanent wetlands from April-August. During this time, a large part of the teal's diet consists of aquatic invertebrates. Vegetable matter will be consumed more readily at other times of the year. Nests are down-lined depressions located in the grass. The incubation period lasts about 24 days. The young are able to fly after an additional 35-44 days. Their population trend is decreasing.																	

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*mallard Anas platyrhynchos		Indigenous		C												C	C	C	C	C
	Yl/c	Wasatch Plateau	The population trend of these game birds is decreasing, despite the fact that they are the most widely distributed duck on breeding areas in North America. Breeding and nesting occurs from April through August. Mallards usually nest on the ground near water. Incubation averages 26 days, and fledging occurs at 42-60 days of age. They are surface feeders which prefer shallow, quite waters where they dabble for aquatic plants and animals.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
*gadwall Anas strepera		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau	The population trend of these game birds is increasing. They inhabit all elevations and are most abundant from mid February through November. Nesting occurs from May through August. An island site is usually chosen, but if not available, nests are built in meadows or on the prairies, provided there is dense vegetation. After a 24-27 day incubation period, young fledge in 48-56 days. Gadwalls are one of the few dabbling ducks that dive for food. Vegetable matter constitutes the bulk of the diet, but insects are also consumed during the summer.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*greater white-fronted goose *Anser albifrons*		Indigenous		C												H	S	S	S	C
	k	Wasatch Plateau	These game birds are spring (April) and fall (September to October) transients. They occur at cold desert elevations and their population trend is stable. Waste grains and cultivated fields provide food and habitat for migrating geese.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
*lesser scaup *Aythya affinis*		Indigenous														C	C	H	C	
	Tr/u	Wasatch Plateau	These game birds are seen at desert and submontane elevations as they pass through on fall (early October to late November) and spring (late February to mid June) migrations. There have also been reports of lesser scaups wintering in southeastern Utah. Lakes are important to these birds. Their population trend is declining. These omnivorous birds show a preference for invertebrates, mollusks, and shrimp.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*redhead Aythya americana		Indigenous														C		C	L	C
	Su/c	Wasatch Plateau	These game birds occur at all elevations as both summer residents and transients. They prefer deep-water wetlands. Those that remain throughout the winter gather in large flocks on lakes. Due to strict bag limits, the declining population trend has slowed. Nests are constructed over water. The crucial nesting period is mid March through mid July. Eggs incubate for 25 days, after which fledging occurs in 56-84 days. These ducks dive for aquatic plants, snails, and insects.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
*ring-necked duck Aythya collaris		Indigenous														C		C	H	C
	Tr/u	Wasatch Plateau	Ring-necked ducks are popular game birds. They occur at all elevations, seeming to prefer lake and pond ecosystems. Their population trend is stable. These diving birds feed on small fish, frogs, tadpoles, crawfish, snails, seed, and grains.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*greater scaup Aythya marila		Indigenous														C		C	L	C
	Tr/a	Wasatch Plateau	These omnivorous game birds frequent large wetland ecosystems of desert and submontane elevations. These birds pass through southeastern Utah on their spring (late March to mid-April) and fall (mid-October to early November) migrations. Their population trend is decreasing.																	
	Tr/a	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/a	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/a	Canyonlands																		
*canvasback Aythya valisineria		Indigenous														C		C	L	C
	Tr/u	Wasatch Plateau	The declining population trend of these game birds has been stopped due to restrictive bag limits. Now their population trend is increasing as compared to the last 30 years. Migrations occur from March to April and October to November. Canvasbacks dive for food. All elevations provide habitat for these birds.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

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*Canada goose Branta canadensis		Indigenous		C												C	C	C	C	C
	Su/c	Wasatch Plateau	These herbivorous game birds occur at all elevations. Their population trend is increasing as they have adapted well to agricultural practices. The breeding season is from March-July, with peak nesting the first week of April. They prefer to construct nests on small islands and frequently nest at reservoirs. The females incubate the eggs for 28-30 days. The young will leave the nest soon after hatching, but will not be able to fly for 9 weeks. Wintering populations depend on the availability of food and open water.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
*bufflehead Bucephala albeola		Indigenous														C		L	C	C
	Tr/u	Wasatch Plateau	These game birds are found at all elevations. They are seen during their spring (late February to early May) and fall (mid October to early December) migrations. Their population trend is stable. These diving birds are omnivorous, preferring animal matter.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*common goldeneye Bucephala clangula		Indigenous														C		L	C	C
	Tr/u	Wasatch Plateau	These game birds frequent desert and submontane elevations. They pass through southeastern Utah during spring (February to April) and fall (October to December) migrations. Their population trend is stable. These diving ducks are omnivorous, with animal matter comprising most of the diet. When feeding, they prefer deeper water.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
*snow goose Chen caerulescens		Indigenous	C													H	S	H	H	C
	Tr/u	Wasatch Plateau	These game birds frequent all elevations. Flocks appear in late February or early March and remain until mid April. They appear again in late September and remain as late as weather conditions permit. The population trend is increasing. Human disturbance of wintering grounds will cause the geese to desert the site. They feed on seeds, aquatic plants, grains, and grasses.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Ross' goose Chen rossii		Indigenous		C												H	S	H	H	C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	Tr/o	Burr Desert																		
	k	Cisco Desert																		
	Tr/o	Canyonlands																		
			Ross' geese are the smallest of North American geese. Their flesh is highly prized by hunters. They are seen during spring (late February to mid April) and fall (August to mid December) migrations. Their population trend is increasing. Forage consists of aquatic plants, grains, and grasses. These geese show a preference for cropland habitat situated next to reservoirs at desert elevations.																	
*trumpeter swan Cygnus buccinator		Indigenous		L												C	H	H	C	C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	Tr/r	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		
			These nongame birds, the largest of all North American wildfowl, are increasing in population numbers. Unfortunately wetland habitat is constantly disappearing due to the encroachment of civilization. Trumpeter swans are dependent upon large wetland ecosystems along their flyway. Southeastern Utah's cold deserts provide habitat for transients passing through on spring and fall migrations. During migration, trumpeters travel in small flocks or family groups. They feed on aquatic vegetation.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*tundra swan Cygnus columbianus		Indigenous														C	S		S	C
	k	Wasatch Plateau	Tundra swans are game birds. During spring and fall migrations, tundra swans typically congregate in large flocks at desert elevations. Their population trend is stable. They feed on aquatic vegetation.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/l	Dolores Triangle																		
	Tr/l	San Rafael Desert																		
	Tr/l	Burr Desert																		
	k	Cisco Desert																		
	Tr/l	Canyonlands																		
*hooded merganser Lophodytes cucullatus		Indigenous														C		L	C	C
	Tr/u	Wasatch Plateau	These game birds inhabit riparian wetland zones during summer months and marsh wetlands in winter. They are found at all elevations and their population trend is stable. Nesting has not been documented in southeastern Utah. These divers feed almost entirely on animal matter.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*white-winged scoter Melanitta fusca		Indigenous														C			C	C
	k	Wasatch Plateau	White-winged scoters are game birds that occur from mid September through November. Their population trend is stable. They have occurred in southeastern Utah at the desert elevation of Desert Lake Waterfowl Management Area. These ducks consume mostly animal matter, particularly mollusks, and occasionally vegetable matter.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
*common merganser Mergus merganser		Indigenous														C		C	C	C
	Tr/c	Wasatch Plateau	Common mergansers are game birds that inhabit all elevations. Transient birds occur from mid February to early May and early October to December. Nesting occurs in June and the birds utilize cavities in trees or ledges along wetland areas. Eggs are incubated for 28-35 days, and young fledge after another 65-85 days. The population trend of these fish eaters appears stable.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	Tr/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*red-breasted merganser *Mergus serrator*		Indigenous														C			C	C
	Tr/o	Wasatch Plateau	These game birds frequent all elevations. They occur from late February to late April and again from early October to December. The population trend is stable. Their principle food is fish.																	
	Tr/o	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	Tr/o	Burr Desert																		
	k	Cisco Desert																		
	Tr/o	Canyonlands																		
*ruddy duck *Oxyura jamaicensis*		Indigenous														C		C	C	C
	k	Wasatch Plateau	Ruddy ducks are game birds that inhabit all elevations. Migrants occur from late February to early May, and from September to November. Nests are baskets of woven grass attached to emergent reeds. Often the birds are parasitic of other species' nests. Males often assist in brood rearing. Incubation requires 23-26 days and the young fledge in 6-7 weeks. They feed almost entirely on vegetable matter, except invertebrates become dominant in their diet during breeding and brood rearing.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Tr/c	Burr Desert																		
	k	Cisco Desert																		
	Tr/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Cathartidae		Indigenous		C						C			C	C	C	C	C			
turkey vulture	Su/c	Wasatch Plateau	These nongame birds are one of Utah's most important raptors because of their carrion diet. They occur at all elevations and their population trend is stable. Vultures utilize their nest territories from 5-15 through 8-15. Cliffs are their preferred nesting sites. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Eggs are laid from April to June and incubated for 38-41 days. The young fledge at 66-88 days of age.																	
Cathartes aura	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
*California condor		Indigenous		L	S	S	S	S	S	S	S	S	S	C	L	L	L			
Gymnogyps californianus	*k	Wasatch Plateau	These nongame birds were once abundant in southeastern Utah throughout precipitous areas at all elevations(*). They were cliff nesting birds. Pesticide contamination, along with unlawful killing of individual birds, has caused them to become extirpated from the state. Condors are federally listed as endangered where they still survive.																	
	*k	Tavaputs Plateau																		
	*k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	*k	Dolores Triangle																		
	*k	San Rafael Desert																		
	*k	Burr Desert																		
	k	Cisco Desert																		
	*k	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Accipitridae		Indigenous				L									C	H		C	C	C
*osprey Pandion haliaetus	Su/r	Wasatch Plateau	These nongame hawks dive for fish. They arrive in early April and can be seen at all elevations. Nests are utilized from 4-15 through 7-15. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Nests are built atop trees, poles, or rock pinnacles near large bodies of water. Young hatch in May or early June after a 32-43 day incubation period. Young fledge at 48-59 days of age. Ospreys migrate out of Utah by early October. Their population trend is stable.																	
	Su/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	Su/r	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		
*Cooper's hawk Accipiter cooperii		Indigenous			H	C	H		H	H								C		
	Su/c	Wasatch Plateau	Coopers hawks are nongame birds which prey upon birds and small mammals. They prefer wooded ecosystems at all elevations. Their population trend is stable. Most summer breeders leave Utah in October and return in March and early April to begin pair bonding. Their nest territories are utilized from 5-1 through 8-15. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Eggs are incubated for 32-36 days and young fledge in another 27-34 days. They generally nest in wooded drainages.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*northern goshawk Accipiter gentilis		Indigenous			C	C	H			H	H									C
	Yl/u	Wasatch Plateau	In the summer, these nongame birds occur in forested montane ecosystems. In winter, they occur at all elevations. Their population trend is stable. Nest territories are situated in aspen or conifer areas within 1/4 mile of water and are utilized from 4-15 through 7-20. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Hikers using trails within 200 yards of nests are frequently attacked. One or two chicks hatch in May after a 36-38 day incubation period. They fledge in another 27-34 days.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Yl/u	Canyonlands																		
*sharp-shinned hawk Accipiter striatus		Indigenous	S			C	H	H			H									C
	Yl/u	Wasatch Plateau	These nongame birds are restricted to heavy brush areas of submontane and montane elevations. Sharp-shinned hawks build nests of twigs, usually in conifer trees. They often return to former nesting sites. The nesting site is a critical use area from 6-20 through 8-15. Active nest sites require a 0.5 mile radius buffer zone protected from human disturbance. Eggs are incubated for 32-35 days and the young have fledged in another 24-27 days. Their diet consists of small mammals and birds. Their population trends appear stable.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*golden eagle Aquila chrysaetos		Indigenous	L	S	L	C	L	L	C	C	H	C	S	S	C	L				H
	Yl/c	Wasatch Plateau	These nongame birds are found in open country at all elevations. These diurnal hunters prey upon mammals and other raptors. Large nests are generally built on cliffs and occasionally in trees or man-made structures. Nest territories are utilized from 2-1 through 8-1. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Eggs incubate for 43-45 days and fledging occurs 66-75 days after hatching. Population trends are increasing.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
*red-tailed hawk Buteo jamaicensis		Indigenous	L	C	S	S	C	H	S	S	C	S	S	S	C	S				H
	Yl/c	Wasatch Plateau	These nongame hawks are very popular with falconers and inhabit all elevations. They prey on small mammals. Their population trend is stable. Nest territories are utilized from 4-10 through 6-30. Active nest sites require a 0.5 mile radius buffer zone protected from human disturbance. Nests are constructed in trees or on cliffs. Eggs incubate for 30-35 days and the young fledge 45-46 days after hatching.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
			Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
rough-legged hawk *Buteo lagopus*		Indigenous	C						H	H	H	H	H	H		C	C	C		
	Wt/c	Wasatch Plateau	These nongame birds do not nest in southeastern Utah. Concentration sites and roost trees are utilized from November through mid March. They frequent open country at desert and submontane elevations. Their population trend is stable. Food preferences are small mammals and birds.																	
	Wt/c	Tavaputs Plateau																		
	Wt/c	Cedar Mountain																		
	Wt/c	Henry Mountains																		
	Wt/c	Abajo/Elk Ridge																		
	Wt/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Wt/c	Canyonlands																		
red-shouldered hawk *Buteo lineatus*		Indigenous	H																C	
	k	Wasatch Plateau	These nongame birds do not nest in Utah, nor are there records indicating that they establish roosting or concentration sites. The birds prefer desert areas. They prey on small mammals and birds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	Tr/a	Cisco Desert																		
	Tr/a	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*ferruginous hawk *Buteo regalis*		Indigenous	S						S		C	C	S	S	C	H	S	H		
	Su/r	Wasatch Plateau																		
	Su/r	Tavaputs Plateau																		
	Su/r	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Yl/r	San Rafael Desert																		
	Yl/r	Burr Desert																		
	Yl/r	Cisco Desert																		
	Yl/r	Canyonlands																		
			These nongame birds are generally diurnal hunters of mammals, bird, and reptiles. They inhabit desert and submontane elevations. Nest territories are utilized between 4-10 and 6-15. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Trees and cliffs provide preferred nesting sites. Eggs incubate for 28-33 days and the young leave the nest in another 2 months. These birds are extremely sensitive to disturbance. Their population trend is stable.																	
*Swainson's hawk *Buteo swainsoni*		Indigenous	C	S			S		H			S		S		C				
	Su/r	Wasatch Plateau																		
	Su/r	Tavaputs Plateau																		
	Su/r	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	Su/r	Burr Desert																		
	Su/r	Cisco Desert																		
	Su/r	Canyonlands																		
			Swainson's hawks are nongame birds that occur at all elevations. Their diet consists of many crop eating insects, as well as small mammals and birds. The population trend appears stable. Nest territories are utilized between 4-20 and 6-25. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Junipers and cottonwoods are the preferred nesting trees. Eggs incubate for 28-35 days and chicks fledge 30 days following hatching. Migration out of Utah occurs in August.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
northern harrier Circus cyaneus		Indigenous	C	L	L	L	L	S	S	L	S	S	H			C	C	H		
	Su/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
			Northern harriers (marsh hawks) are valuable rodent hunters. Preferred habitat consists of marshes at all elevations. The hawks prefer hunting live prey including: small mammals, birds, amphibians, reptiles, and some insects. Nests are constructed with sticks and grasses either on the ground or in low vegetation. Mating takes place in early April and nesting by early May. The young hatch in June after a 31-32 day incubation period. They are fledged at 30-35 days of age. The population trend of the marsh hawk is stable.																	
*bald eagle Haliaeetus leucocephalus		Indigenous	S		L	L	L	S	L	S	S	L	L			C	H	H		
	Yl/e	Wasatch Plateau																		
	Wt/e	Tavaputs Plateau																		
	Wt/e	Cedar Mountain																		
	Wt/e	Henry Mountains																		
	Wt/e	Abajo/Elk Ridge																		
	Wt/e	LaSal Mountains																		
	Yl/e	Dolores Triangle																		
	Wt/e	San Rafael Desert																		
	Wt/e	Burr Desert																		
	Yl/e	Cisco Desert																		
	Wt/e	Canyonlands																		
			These carnivorous, nongame birds prefer areas near water surrounded by open country and available perching sites. Most are seen from early November through March at all elevations. Their roost and nest trees, as well as concentration areas, must be protected from human disturbance with a one mile radius buffer zone. Southeastern Utah has the only two nest sites in the state. Nest territories are utilized from 1-1 through 7-15. There is a 34-36 day incubation time. The young fledge at 70-98 days of age. Population levels are increasing.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Harris' hawk (Parabuteo unicinctus)		Indigenous									S	S		S	S	S		S	
	k	Wasatch Plateau	This species has been observed during fall migration along the Colorado River, near Moab. It utilizes desert and submontane elevations.																
	k	Tavaputs Plateau																	
	k	Cedar Mountain																	
	k	Henry Mountains																	
	k	Abajo/Elk Ridge																	
	k	LaSal Mountains																	
	k	Dolores Triangle																	
	k	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	Tr/a	Canyonlands																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Falconidae		Indigenous	S						S			S	S	H	C	H				C
*merlin	k	Wasatch Plateau	These nongame birds inhabit desert elevations. Transient populations peak from mid September to mid October and again in March. Nesting occurs in cavities of trees or ledges. Nest territories are utilized from 4-15 to 6-25. Active nests require a 0.5 mile radius buffer zone protected from human disturbance. Eggs are incubated for 28-32 days and young fledge in another 30-35 days. Their diet consists almost entirely of birds. Their population trend is decreasing.																	
Falco columbarius	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		
*prairie falcon		Indigenous	H	S			H		H	H	C	H	C	C			H			
Falco mexicanus	Yl/c	Wasatch Plateau	Prairie falcons are nongame birds that are popular with falconers. They inhabit all elevations but prefer desert areas adjacent to cliffs. Their diet consists of small mammals, birds, and insects. Nest territories are utilized from 4-1 through 7-15. Active nests require a 0.5 mile radius buffer zone located on a cliff face. Eggs incubate for 28-35 days after which chicks fledge in 35-42 days. Their population trend appears stable.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*peregrine falcon *Peregrinus anatum*	Yl/e	Indigenous Wasatch Plateau	S	S		S	S	S	S	S	S	S	S	S	C	H	H	C		
	Yl/e	Tavaputs Plateau																		
	Yl/e	Cedar Mountain																		
	Yl/e	Henry Mountains																		
	Yl/e	Abajo/Elk Ridge																		
	Yl/e	LaSal Mountains																		
	Yl/e	Dolores Triangle																		
	Yl/e	San Rafael Desert																		
	Yl/e	Burr Desert																		
	Yl/e	Cisco Desert																		
	Yl/e	Canyonlands																		
American kestrel *Falco sparverius*	Su/c	Indigenous Wasatch Plateau	S	H			C		S	H	C				S		H		C	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

These nongame, carnivorous birds occur at all elevations. Nests are built of cliff faces and are utilized from 2-1 through 8-31. A one mile radius buffer zone needs to be protected from human disturbance in excess of historical activities. Eggs incubate for 29-32 days, after which the young fledge in 35-42 days. Their population trend is increasing. The Arctic (p.a. tundrius) and American (P.a. anatum) subspecies inhabit southeastern Utah. The former subspecies is a winter resident while the latter remains yearlong.

These nongame birds prey upon insects and rodents. Although they occur at all elevations, they prefer desert zones. Nest territories are utilized from 5-1 through 6-30. Due to their adaptability, a buffer zone in which human disturbance should be excluded is not warranted. Their nests are located in tree cavities, cliffs, or old buildings. Eggs incubate for 29-31 days, and the young fledge in another 30-60 days. Their population trend is stable.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Phasianidae		Exotic							C	S	S	C		C	C	C		C		
*chukar	Yl/c	Wasatch Plateau	These insectivorous, herbivorous game birds prefer rocky, grassy, or brushy slopes in arid mountains and canyons of desert and submontane elevations. Nests are usually built under shrubs or clumps of grass. Nest sites are critical to maintenance of the population during the crucial nesting period. The breeding season begins by mid March and nesting by April/May. There is a 22-24 day incubation period and the young are fledged at 7-10 days of age. Winter is a crucial period for survival of the chukars. Their population trend is stable.																	
Alectoris chukar	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
*ring-necked pheasant		Exotic	C						S	L				H		C	C	C		
Phasianus colchicus	k	Wasatch Plateau	These game birds inhabit desert and submontane elevations. Grains, seeds, and vegetation are the primary food items but insects are also consumed during the spring and summer. Nesting occurs from mid April-mid July in grassy depressions. Pheasants may establish up to three nests but hatch and rear only one brood per year. Eggs are incubated for 23-25 days and fledging requires 12 days. The population trend is decreasing due to habitat loss. The Afghan white-winged subspecies (P.c. bianchii) also inhabits southeastern Utah at Bluff.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*ruffed grouse Bonasa umbellus		Indigenous				C	C	S		C								H		C
	Yl/c	Wasatch Plateau	These game birds occur at submontane and montane elevations. They feed exclusively on staminate aspen buds from December through February. Other vegetation and insects are utilized during the remaining part of the year. Breeding is a crucial period from March through May and is centered around a drumming log. Nests are shallow depressions located at the bases of shrubs or trees. Eggs are incubated for 21-28 days and the young fledge after another 10-12 days. Maintenance of uneven-aged stands can prove beneficial.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
*sage grouse Centrocercus urophasianus		Indigenous	H						C									H		H
	Yl/l	Wasatch Plateau	The population trend of these game birds is stable. They occur at submontane elevations, and forage entirely on sagebrush from October to April. During other seasons, insects and vegetation are consumed. Wet meadows surrounded by sagebrush are critical strutting grounds (leks) from mid March-April. Shrub cover should be 10-50%. Habitat within a two mile radius of leks is critical for nesting through mid August. Nests are shallow depressions located under sagebrush. There is a 21-24 day incubation period. Young can fly after 7-10 days.																	
	Yl/l	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	Yl/l	LaSal Mountains																		
	Yl/l	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/l	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*blue grouse Dendragapus obscurus		Indigenous			C	C	H	H	C	C	L						L		L	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
		Blue grouse are game birds that inhabit submontane and montane zones. During the winter, blue grouse feed exclusively upon needles and buds of Douglas fir and spruce trees. Annually they exhibit reverse vertical spring migration since they migrate from high elevations to lower elevation meadows, brush, or timber stands for breeding, nesting, and brooding. Nests are located on the ground. Hatching occurs in early June after a 25-26 day incubation period. Young can fly after 7-10 days. Their population trend is stable.																		
*wild turkey Meleagris gallopavo		Indigenous		C		H	H	C	S	C	H						C		C	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/l	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/l	Dolores Triangle																		
	Yl/l	San Rafael Desert																		
	k	Burr Desert																		
	Yl/l	Cisco Desert																		
	Yl/l	Canyonlands																		
		These game birds feed at all elevations on grasses, forbs, mast, and insects. Populations are stable. Silviculture practices can be harmful to the turkey. Nesting occurs in April and May with a preference for slopes >20%. Spring grazing of nest areas can reduce cover for birds. Eggs are incubated for 27-28 days and poults are brooded throughout summer. Brooding areas evidence high forb and grass densities. Merriam (M.g. Merriami) and Rio Grande (M.g. intemedia) subspecies occur in the region.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*California quail Callipepla californica		Exotic	H	C					S	C							C		C	
	Yl/l	Wasatch Plateau																		
	Yl/l	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	Yl/l	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/l	Canyonlands																		
*Gambel's quail Callipepla gambelii		Indigenous		C					S			S	S				C	S	C	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	Yl/l	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

These game birds inhabit cold desert and submontane zones and their population trend is stable. They prefer brushy, streamside habitats adjacent to farmlands. Vegetable matter, especially clover, is their primary food source. Nests are slight depressions lined with plant material. Nesting begins in May after an April breeding season. There is a 21-24 day incubation period and fledging occurs 10 days later. Winter is a crucial period as heavy snows can limit food supplies.

These game birds inhabit cold desert areas. They feed on seeds, grain, vegetation, and insects. Territories are established after pair-bonding in late winter or early spring. Nests are placed in desert vegetation, usually beginning in April, and the eggs hatch after a 21-24 day incubation period. A 10 day nesting period follows. Winter is a crucial period when water and vegetation become scarce. The population trend of Gambel's quail is decreasing.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened, (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Rallidae *American coot Fulica americana		Indigenous		H												C	C	C	C	C
	Su/l	Wasatch Plateau																		
	Su/l	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/l	Henry Mountains																		
	Su/l	Abajo/Elk Ridge																		
	Su/l	LaSal Mountains																		
	Su/l	Dolores Triangle																		
	Su/l	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/l	Canyonlands																		
		These game birds inhabit all elevations. Aquatic plants, grasses, and grain are their primary food sources. Preferred habitat consists of open shorelines, deep water areas, and emergent vegetation. Nests are constructed over water from May to late June. Renesting is quite common. Two broods will often be raised each year, with both parents incubating the eggs for 21-25 days. A 49-56 day nestling period follows. The coot's population trend is stable.																		
common moorhen Gallinula chloropus		Indigenous														C		C	C	C
	Tr/a	Wasatch Plateau																		
	Tr/a	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/a	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/a	Canyonlands																		
		These nongame birds feed on seeds, insects, and aquatic invertebrates. They rely on wetland habitats of cold desert and submontane zones. They pass through southeastern Utah in the spring and fall. Courtship is probably initiated during the spring migration. This species is very secretive and does not appear to be especially abundant anywhere in its range. The population may be decreasing due to the loss of wetlands.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
sora Porzana carolina		Indigenous														C	C	C		
	Su/u	Wasatch Plateau	These omnivorous, nongame birds are usually found in cold desert areas, but they will also inhabit submontane elevations. Nesting occurs from May through July on marshlands. Nests are grass baskets suspended up to six inches above water. There is an incubation period of 18-20 days and fledging occurs 21-25 days later. Degradation of wetlands is gradually reducing the sora's habitat, thus their population trend is declining.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
Virginia rail Rallus limicola		Indigenous														C	C	C		
	Su/c	Wasatch Plateau	These nongame birds inhabit cold desert and submontane zones. They feed on aquatic animal life, seeds, berries, and insects. Nests are saucer-like mats of reeds and grasses built in shallow marshes. Nesting extends from late April to mid June. Eggs are incubated for 18-20 days and the young are capable of flight after another 25 days. Fall migrations begin in September and October. Those that winter in Utah inhabit lower elevation marshes that do not freeze. Their population trend is decreasing due to the loss of wetlands.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Gruidae		Indigenous		C						H				H			C	C		
*whooping crane	Tr/e	Wasatch Plateau	Whooping cranes are an endangered species that occur at all elevations. They winter outside of Utah in prairies, grain fields, and marshes. They summer in mountain meadows and marshes. Peak migration periods are April-June and August-November. The population trend of the whooping crane is increasing due to management strategies.																	
Grus americana	Tr/e	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/e	Dolores Triangle																		
	Tr/e	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/e	Canyonlands																		
*sandhill crane		Indigenous		C						H				H			C	C		
Grus canadensis	Tr/u	Wasatch Plateau	Most of these birds are migrants passing through during the spring (April 3 to June 8) and fall (August 28 to November 25). They utilize all elevations. In recent years, two pairs are known to have nested at or nearby Desert Lake Waterfowl Management Area. Nesting occurs on the ground from May-July. Eggs incubate for 30 days and fledging occurs in another 67 to 75 days. They feed upon small rodents, frogs, and insects. Their population trend is stable. Harvest of these birds is not yet allowed in southeastern Utah.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Charadriidae *snowy plover Charadrius alexandrinus		Indigenous														C	C	C	C	C
	Tr/r	Wasatch Plateau	These nongame birds pass through southeastern Utah from April through September. They frequent shorelines and mud flats at all elevations. Plovers feed on insects and aquatic invertebrates. Their population trend is unknown.																	
	Tr/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/r	Henry Mountains																		
	Tr/r	Abajo/Elk Ridge																		
	Tr/r	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	Tr/r	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		
*mountain plover Charadrius montanus		Indigenous	C			H			H			H					C			
	Tr/r	Wasatch Plateau	These nongame birds fly through southeastern Utah during spring (late March through June) and fall (late August through early October) migrations. They frequent semi-arid grasslands at all elevations where they forage for insects, aquatic invertebrates, and worms. The population trend of the mountain plover is unknown.																	
	Tr/r	Tavaputs Plateau																		
	Tr/r	Cedar Mountain																		
	Tr/r	Henry Mountains																		
	Tr/r	Abajo/Elk Ridge																		
	Tr/r	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	Tr/r	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
semipalmated plover		Indigenous		C		H										C	C	C	C	C
Charadrius semipalmatus	Tr/u	Wasatch Plateau	These nongame birds migrate through southeastern Utah in the spring (mid March through April) and fall (August to mid September). They frequent wetland areas at all elevations. They feed mainly on insects, marine invertebrates, and worms. Their population trend is stable.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
killdeer		Indigenous	H	C												C	C	C	C	C
Charadrius vociferus	Su/c	Wasatch Plateau	These nongame birds are typically summer residents. However, a few remain in the winter where there are warm springs or small streams that remain open. They inhabit all elevations and forage for insects, aquatic invertebrates, and worms. Nests are scrapes in fields, gravel pits, roadways, etc. Nesting occurs from early April through July. Eggs are incubated for 24-28 days and fledging occurs after another 25 days. Evidence suggests that two broods may be produced. The population trend of killdeer is stable.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
lesser golden plover *Pluvialis dominica*		Indigenous		S					S					S		C	C	C	C	C
	Tr/u	Wasatch Plateau																		
	Tr/u	Tavaputs Plateau																		
	Tr/u	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	Tr/u	Cisco Desert																		
	Tr/u	Canyonlands																		
			Golden plovers are nongame birds which migrate through southeastern Utah from early May to early July and mid September through October. They appear to be more numerous during the fall migration. They inhabit all elevations and feed upon insects, aquatic invertebrates, and worms. The population trend of this species is stable.																	
black-bellied plover *Pluvialis squatarola*		Indigenous		H												C	C	C	C	C
	Tr/u	Wasatch Plateau																		
	Tr/u	Tavaputs Plateau																		
	Tr/u	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
			These nongame birds are transients through southeastern Utah from April to June and again from August to mid October. During these migrations, they frequent all elevations. They are carnivorous and prey upon insects, aquatic invertebrates, and worms. The population trend of the black-bellied plover is stable.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Recurvirostridae black-necked stilt Himantopus mexicanus		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			Due to human disturbances and habitat loss, the population trend of these nongame birds is decreasing. They inhabit all elevations. These colonial shorebirds wade in alkaline lakes and feed upon crustaceans, insects, and other small aquatic life. Their nests are built of mud, sticks, shells, and pebbles and are located along shorelines or within mud flats. Eggs are laid from April through June and incubated for 25 days. Fledging occurs after another 4 weeks.																	
American avocet Recurvirostra americana		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			These nongame birds inhabit all elevations. They appear from mid February to mid December, and their population trend is decreasing due to habitat loss. These colonial wading birds feed upon crustaceans, insects and small aquatic life. Nests are slight created on sand or mudflats. Nesting occurs in May. Eggs incubate for 22-29 days, and fledging occurs after a 28-35 day period. It is not uncommon for avocets and stilts to nest in a common colony.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Scolopacidae spotted sandpiper Actitis macularia		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau	These nongame birds occur at all elevations from late April to late September. A few birds remain throughout the winter at lower elevations where they can still probe in the mud or sand for small invertebrates. Nesting occurs in May and June. Nests are grassy scrapes usually located under shrubs near water. The eggs are incubated for three weeks, followed by a 17-21 day nestling period. Mice prey heavily on the eggs. The population trend is stable.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
sanderling Calidris alba		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau	Sanderlings are found at all elevations. The population trend of these nongame birds appears stable. Number of birds seem to be greater during the spring migrations (mid April to mid June) as compared to the fall (early August to mid November) migrations. Sanderlings follow advancing and receding waves to feed on mollusks and crustaceans.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Baird's sandpiper *Calidris bairdii*		Indigenous														C	C	C	C
	Tr/u	Wasatch Plateau	These nongame birds occur at all elevations. Their population trend is stable. During their feeding, small invertebrates are picked instead of probed. Baird's sandpipers are easily approached and tamed.																
	Tr/u	Tavaputs Plateau																	
	k	Cedar Mountain																	
	Tr/u	Henry Mountains																	
	Tr/u	Abajo/Elk Ridge																	
	Tr/u	LaSal Mountains																	
	Tr/u	Dolores Triangle																	
	Tr/u	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	Tr/u	Canyonlands																	
western sandpiper *Calidris mauri*		Indigenous														C	C	C	C
	Tr/c	Wasatch Plateau	Western sandpipers occur at all elevations. The population trend of these nongame birds appears stable. Their migration routes pass through southeastern Utah from March-June and July-October. These birds may submerge their heads while probing for aquatic invertebrates.																
	Tr/c	Tavaputs Plateau																	
	k	Cedar Mountain																	
	Tr/c	Henry Mountains																	
	Tr/c	Abajo/Elk Ridge																	
	Tr/c	LaSal Mountains																	
	Tr/c	Dolores Triangle																	
	Tr/c	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	Tr/c	Canyonlands																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
pectoral sandpiper *Calidris melanotos*		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau	Pectoral sandpipers are found at all elevations during spring (March through May) and fall (late June into October) migrations. These nongame birds appear to have a stable population trend. They feed on small invertebrates in marshes and at pond edges.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
least sandpiper *Calidris minutilla*		Indigenous														C	C	C	C	C
	Tr/c	Wasatch Plateau	These nongame birds are the smallest regularly occurring sandpipers. They inhabit all elevations and their population trend is stable. Large flocks often appear along lakeshores and pond edges from early February to early June and late July to mid September. Small numbers may even remain through the winter where warm springs prevent ice-out. Least sandpipers probe in the mud and pick at the surface for small invertebrates.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
willet Catoptrophorus semipalmatus		Indigenous																		
	Su/u	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
			H													C	C	C	C	C
These nongame birds inhabit submontane and montane wetlands from late February to early October. Formerly common, their population trend is decreasing. The loss of critical wetland habitat is the largest threat to these birds. Their diet consists of insects, crustaceans, mollusks, and berries. Nests are simple depressions in the grass. The nesting season is from May to mid July. There is a 22-29 day incubation period. The young only remain in the nest for a few hours.																				
*common snipe Gallinago gallinago		Indigenous																		
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
			H													C	C	C	C	C
Common snipes utilize wetlands of all ecological associations. The population trend of these nongame birds is unknown. Those that remain throughout the winter seek out streams and springs that do not ice out, since they probe into the mud for plant and animal material. Nests are simple depressions in the grass and eggs are usually laid between mid April and July. There is a 19 day incubation period. Upon hatching, the adults will divide the brood of 4-5 young and raise them to fledging in about 19-20 days.																				

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
short-billed dowitcher *Limnodromus griseus*		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau	These nongame birds inhabit wetlands of desert and submontane elevations. Their population trend is stable. Evidence indicates that they are only transients in the spring (April through May) and fall (September through mid October). This species feeds in deeper water than most shore birds, probing their bill into the mud for aquatic invertebrates.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
long-billed dowitcher *Limnodromus scolopaceus*		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau	Long-billed dowitchers occur at all elevations. These nongame birds often appear in large flocks in May and August-September with some residing throughout the summer. Migrators tend to frequent freshwater ponds. Nests are usually simple depressions. These birds probe in the mud for aquatic invertebrates.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
marbled godwit Limosa fedoa		Indigenous							H					H		C	C	C	C	C
	Tr/c	Wasatch Plateau	These nongame birds inhabit all elevations and have a stable population trend. Godwits are present as transients during spring (mid April through May) and fall (July to September) migrations. Some may remain into the winter months. Mud and alkali flats are important to the migrants. Their diet consists of invertebrates found in these flats.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/c	Canyonlands																		
*long-billed curlew Numenius americanus		Indigenous	C						C					C		C	C	C	C	C
	Su/r	Wasatch Plateau	These nongame birds are found at all elevations from mid March through November. They prefer plains, prairies, and rangelands near water. Small invertebrates are their main food items. Their population trend is unknown, but may be declining due to disturbances by man and livestock on their breeding grounds. Nests are grassy depressions formed on open prairies. Breeding populations are present from mid April to mid August. Eggs are incubated for 27-30 days and the young fledge in another 32-45 days.																	
	Su/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
lesser yellowlegs Tringa flavipes		Indigenous														C	C	C	C	C
	Tr/c	Wasatch Plateau	Lesser yellowlegs are dependent upon shorelines at desert, submontane, and montane elevations. These nongame birds appear from early March through May and from early July to mid September. Their population trend is stable. Their diet consists of small invertebrates.																	
	Tr/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/c	Henry Mountains																		
	Tr/c	Abajo/Elk Ridge																		
	Tr/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/c	Canyonlands																		
greater yellowlegs Tringa melanolevca		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau	Greater yellowlegs are found at all elevations. These nongame birds occur from mid February to mid May and early July to mid December. Their population trend is stable. Their diet consists primarily of fish and invertebrates, although berries are occasionally consumed.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
solitary sandpiper *Tringa solitaria*		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau																		
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
			Solitary sandpipers inhabit all elevations. These nongame birds appear from early April to mid June and late July to late September. They generally migrate at night and do not tend to form flocks. Their population trend is stable. They probe for small invertebrates in the mud or sand.																	
red-necked phalarope *Phalaropus lobatus*		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			These nongame birds frequent lacustrine wetland systems at all elevations. Their population trend is stable. Migrations occur from early April to June (peaking about mid May), and from mid July through September (peaking in August). Relative abundance appears greater during the autumn migration. Northern phalarope feed upon insects, crustaceans, and plankton. Nest sites are located on the ground and are utilized in April and May. Eggs are incubated for 17-21 days and the young fledge in another 20 days.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Wilson's phalarope Phalaropus tricolor		Indigenous	S													C	C	C	C	C
	Su/c	Wasatch Plateau	These nongame birds are found at all elevations. Their population trend is stable. Summer residents breed and nest in grass or sedge habitats near water. Nesting occurs in May and June. The male will incubate the eggs for 16-21 days and brood the young. Only one egg will hatch each day. Young leave the nest a few hours after hatching. The birds are usually more numerous during July and August migrations. Phalaropes spin in shallow water to stir up food such as crustaceans, insects, and seeds.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
Family: Laridae herring gull Larus argentatus		Indigenous	H	H												C	C	C	C	C
	Tr/u	Wasatch Plateau	These nongame birds have been recorded between September and late May at all elevations. Their population trend is stable. They feed on carrion, garbage, refuse, marine animals, eggs, and young birds. Ice-covered reservoirs are used for winter roosting.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*California gull Larus californicus		Indigenous	H	H												C	C	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
ring-billed gull Larus delawarensis		Indigenous	H	H												C	C	C	C	C
	Wt/c	Wasatch Plateau																		
	Wt/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Wt/c	Henry Mountains																		
	Wt/c	Abajo/Elk Ridge																		
	Wt/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Wt/c	Canyonlands																		

This species is the Utah state bird and is well known for saving the Mormons from the 1848 grasshopper plague. They also feed on bird eggs, carrion, and garbage. They are seen from about mid February to early September at all elevations. Large colonies nest on islands and dikes from mid April to mid July. Both sexes incubate the eggs for about 25 days. A nestling time of 45 days follows. Banding records indicate that young birds hatched in Utah migrate to the Pacific coast where they remain until ready to breed.

These nongame gulls are found at all elevations. They have a stable population trend. They consume garbage, refuse, carrion, aquatic animals, rodents, and insects. Garbage dumps can provide feeding grounds in the winter. Interestingly, these birds breed along the Pacific coast, particularly in California and winter in the Intermountain West.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
glaucous gull Larus hyperboreus		Indigenous														C	C	C	C	C
	k	Wasatch Plateau	Glaucous gulls, although generally coastal birds, have been recorded using marshlands at Desert Lake Waterfowl Management Area. All recorded sightings are from February, March, and April. The population trend of this nongame species appears stable. These predatory gulls consume carrion, refuse, birds, and marine invertebrates.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Bonaparte's gull Larus philidelphia		Indigenous														C	C	C	C	C
	Tr/u	Wasatch Plateau	These gregarious, nongame gulls are seen during their spring (April to mid May) and fall (August to mid November) migrations. They inhabit all elevations and their population trend is stable. Bonaparte's gulls feed on insects, small fish, and crustaceans. Water availability is critical to this species.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Franklin's gull Larus pipixcan		Indigenous		C					H					H		C	C	C	C	C
	Su/c	Wasatch Plateau	The population trend of these nongame birds is stable. They are found at all elevations and breed at wetland areas from April to November, where colonial nesting occurs. Both parents incubate the eggs for 24-25 days, however, they will desert the nest if disturbed. They young can fly at 32 days of age. Coots will compete for their nest sites. These birds often follow plows and catch insects in the air. They also feed on fish, frogs, and mollusks.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
black tern Chlidonias niger		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau	Black terns occur at all elevations. Their population trend is stable. Small colonies nest in marshes from May through June. Nests are built on the ground, in marsh vegetation, or on muskrat houses. Incubation lasts 21-22 days followed by a 3-4 week nestling period. Insects comprise the primary food source for black terns.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Caspian tern Sterna caspia		Indigenous														C	C	C	C	C
	Tr/r	Wasatch Plateau	Caspian terns utilize wetlands of any ecological association during their spring and fall migrations. The population trend for these nongame birds is stable. Caspian terns make powerful booby-like dives when hunting for fish. These birds are often disturbed by the predatory California gull and man.																	
	Tr/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/r	Henry Mountains																		
	Tr/r	Abajo/Elk Ridge																		
	Tr/r	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		
Forster's tern Sterna forsteri		Indigenous														C	C	C	C	C
	Su/c	Wasatch Plateau	These nongame birds appear at all elevations from late March to mid October, and their population trend is stable. Colonial nesting occurs in late May and mid June. Cattail and bulrush marshes around lakes and sloughs provide preferred nesting areas. Nests are constructed of marsh vegetation and built on muskrat houses or other platforms. Both parents incubate the eggs for 23-24 days. Young will leave the nest at 4-7 days of age. Terns dive from the air for small fish, insects, and frogs.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
common tern		Indigenous														C	C	C	C	C
Sterna hirundo	Tr/u	Wasatch Plateau	These nongame birds are present at all elevations during their spring (late April to mid June) and fall (mid August to early November) migrations. They are usually considered to be uncommon, although they may easily be overlooked due to their resemblance to Forster's terns. Their population trend is stable. These terns dive for aquatic life.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
Family: Columbidae		Indigenous	H			C	C	H	H	S								H		
*band-tailed pigeon	Su/o	Wasatch Plateau	The diet of these game birds varies according to the availability of acorns, buds, flowers, and cultivated crops. They begin arriving during mid April at submontane and montane elevations. Nesting occurs from May through July, with an 18-20 day incubation period and 25-27 day nestling period. Conifers are utilized as nest and roost trees. Migration out of Utah occurs from August through October, possibly depending on food supply. The population trend is stable, although increasing residential development is reducing habitat for the birds.																	
Columba fasciata	Su/o	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/l	Abajo/Elk Ridge																		
	Su/l	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/o	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rock dove Columba livia		Exotic	H	C											C					
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
		These unprotected nongame birds are found at desert and submontane elevations. Their population trend is stable. Semi-wild flocks occur in city streets or around farms, and a domesticated variety is popular with pigeon fanciers. Roots, stems, and leaves are used to create nests that are located on buildings, ledges, cliffs, or in trees. Three to six broods are raised each year between spring and fall. Eggs incubate for 16-19 days and the young fledge in another 25-26 days. Doves feed during the day on grains, small seeds, and fruit.																		
*passenger pigeon Ectophistes migratorius		Indigenous			H	H	H	S	S	S								H		
	*k	Wasatch Plateau																		
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	*k	Dolores Triangle																		
	*k	San Rafael Desert																		
	*k	Burr Desert																		
	k	Cisco Desert																		
	*k	Canyonlands																		
		This species, once a popular game bird, is not known to survive any place in the world. Unrelenting harvest by market hunters decimated their populations. During its existence, it only occurred as an occasional straggler west of the Rockies. It was likely present within the region (*) at submontane and montane elevations.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

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			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
ringed turtle dove		Exotic	H	H																C
Streptopelia risoria	k	Wasatch Plateau	These nongame birds have been domesticated widely. Their origin is unknown. Records of escaped captives have been reported at the desert ecological association of Moab, Utah. They have an unknown population trend. Nests are built of twigs and located in trees. They feed on vegetation and insects.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/a	Canyonlands																		
white-winged dove		Indigenous	S	H					S	S	S									C
Zenaida asiatica	k	Wasatch Plateau	These nongame birds are seen at desert and sub-montane elevations from April to early August. Their population trend is unknown. Nests are crude stick platforms built in trees or thickets. Breeding begins in late March, depending on weather conditions. There is a 14 day incubation period. Another 2 weeks is required for fledging. When not breeding, these doves often gather in large flocks, feeding upon seeds, grain, insects, and fruit.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	Su/a	Burr Desert																		
	k	Cisco Desert																		
	Su/a	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*mourning dove Zenaida macroura		Indigenous	S	C					S	C	C	S	S	H		S		C		
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
Family: Cuculidae *yellow-billed cuckoo Coccyzus americanus		Indigenous	S	S						C	C							C		
	Su/r	Wasatch Plateau																		
	Su/r	Tavaputs Plateau																		
	Su/r	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	Su/r	Burr Desert																		
	Su/r	Cisco Desert																		
	Su/r	Canyonlands																		

Mourning doves are popular game birds which feed upon grains and seeds. Nests are loosely constructed with twigs. They are usually built in trees, shrubs, cacti, or on the ground. Most breeding and nesting activity occurs between March and September. A 13-14 day incubation period is followed by a 12-14 day nestling period. Mourning doves occur at all elevations. They have adapted well to man's intrusion upon their environment but their population trend is declining in the western states for unknown reasons.

These nongame birds are found in submontane second growth forest and desert riparian ecosystems. Their population trend is unknown. Nests are frail twig platforms. Nesting occurs from June through July. Both parents incubate the eggs for 9-11 days followed by a short 7-8 day nestling period. These birds consume seeds, fruit, and insects (particularly caterpillars).

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Tytonidae		Indigenous	S	H					S	S	S	S	S	S	C	S				S
common barn-owl	Yl/u	Wasatch Plateau	These nocturnal, nongame birds help control rodent populations. They inhabit desert and submontane elevations. Nest territories are utilized from 4-20 through 7-20. Active nests require a 0.5 mile radius buffer zone protected from human disturbance in excess of historical activity. Nests are situated in burrows, hollow trees, caves, barns, or belfries. Eggs incubate for 30-34 days. Young fledge in another 52-56 days. Their population trend is unknown.																	
Tyto alba	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Yl/u	Burr Desert																		
	Yl/u	Cisco Desert																		
	Yl/u	Canyonlands																		
Family: Strigidae		Indigenous			H	C	H			H									C	
norther saw-whet owl	Yl/u	Wasatch Plateau	Saw-whet owls are nocturnal, nongame birds that prey upon small mammals. They inhabit submontane and montane forests. Nest territories are utilized from 4-1 through 6-31. Active nests require a 0.25 mile radius buffer zone protected from human disturbance. Tree cavities are preferred nesting sites. Eggs incubate for 26-28 days, and fledging occurs after another 27-34 days. Saw-whet owls do not migrate, but travel as nomads in search of food. Their population trend is stable.																	
Aegolius acadicus	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
short-eared owl Asio flammeus		Indigenous	L	C					H			S	S	C		C	C	H		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/l	Dolores Triangle																		
	Su/l	San Rafael Desert																		
	Su/l	Burr Desert																		
	Su/l	Cisco Desert																		
	Su/l	Canyonlands																		
long-eared owl Asio otus		Indigenous			H	C	H		C	C								C		
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

These nongame owls prey upon small mammals and are most active at dawn and dusk. They inhabit desert elevations. Nest territories are utilized from 4-10 through 6-15. Nests are depressions in the ground. Active nests require a 0.25 mile radius buffer zone protected from human disturbance. If the nest is disturbed, these owls may renest. Eggs incubate for 26-28 days and fledging occurs in an additional 31-36 days. Short-eared owls are often gregarious under favorable conditions. Their population trend is stable.

These nongame birds are nocturnal and most of their diet consists of rodents. They inhabit all elevations. Nest territories are utilized from 3-15 through 6-15. Active nest sites require a 0.25 mile radius buffer zone protected from human disturbance. Abandoned nests of other bird species are utilized for nesting. Eggs incubate for 26-28 days and fledging occurs in another 30-40 days. These owls have few enemies, except man. Their population trend is stable.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
burrowing owl Athene cunicularia		Indigenous	L	S						H			H	H	H		S			
	Su/l	Wasatch Plateau	These nongame owls occur at desert and submontane elevations. They are diurnal or crepuscular predators of rodents, lizards, and birds. Abandoned prairie dog, badger, or marmot burrows are utilized as nest sites. Nesting beings in May and the eggs are incubated for 21-28 days. The young generally emerge from the burrow in early June and are fully fledged at four weeks of age. Encroachment of civilization and rodent control activities have resulted in a declining population trend.																	
	Su/l	Tavaputs Plateau																		
	Su/l	Cedar Mountain																		
	Su/l	Henry Mountains																		
	Su/l	Abajo/Elk Ridge																		
	Su/l	LaSal Mountains																		
	Su/l	Dolores Triangle																		
	Su/l	San Rafael Desert																		
	Su/l	Burr Desert																		
	Su/l	Cisco Desert																		
	Su/l	Canyonlands																		
great horned owl Bubo virginianus		Indigenous	S		C	L	S	S	H	C	S	S	S	C	S		C			
	Yl/c	Wasatch Plateau	These nongame birds occur at all elevations. They are nocturnal hunters which prey almost entirely on mammals. Other animals may be eaten depending on availability. Territories are established by November and mating takes place in December and January. Eggs are deposited on cliff ledges or in old hawk and raven nests from February through March. The incubation period is 26-35 days. The young owls fledge in 35 days but are cared for at least four to five weeks later. The population trend of these birds is stable.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
northern pygmy owl Glaucidium gnoma		Indigenous	L	L		C		H		H	H									C
	Yl/u	Wasatch Plateau	These nongame birds occur at submontane and montane elevations. They are diurnal and crepuscular hunters of rodents and insects. Nesting occurs from May-August in abandoned woodpecker holes or natural tree cavities. Hatching occurs after a 21-28 day incubation period. Fledging requires 27-28 days. Pygmy owls often migrate to lower elevations during severe winters. The population trend for these nongame birds is unknown.																	
	Yl/u	Tavaputs Plateau																		
	Yl/u	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Yl/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
flammulated owl Otus flammeolus		Indigenous				C	C	C												H
	Su/u	Wasatch Plateau	These nongame owls are rarely seen due to their crepuscular activity. Their diet consists almost entirely of insects, but occasionally small mammals and birds are hunted. Nests are constructed in old woodpecker or squirrel holes sometime during June and the eggs incubate for 26 days. The young owls are ready to leave the nest at 22-25 days of age. Flammulated owls migrate south of the U.S. in late fall. The population trend for these montane inhabitants is unknown.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
western screech-owl Otus kennicotti		Indigenous	S	C		C	H	C	S	S	H					H		C		
	Yl/u	Wasatch Plateau	These nongame birds are beneficial at keeping rodent and insect populations in check. They occur at all elevations. Nesting begins by March or April in natural tree cavities or abandoned woodpecker holes. Suitable nest and roost sites are critical. The young screech owls fledge at 4 weeks of age after a 21-30 day incubation period. The population trend of these birds is stable.																	
	Yl/u	Tavaputs Plateau																		
	Yl/u	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Yl/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
*spotted owl Strix occidentalis		Indigenous						C		H	H				C			H		
	k	Wasatch Plateau	These nongame owls occur at all elevations and are associated with old growth ponderosa forests and nearby deeply shaded canyons. Spotted owls are nocturnal, sedentary, and heat intolerant. Nesting sites are hollow trees, cliff caverns, or old hawk nests. Eggs are laid in late March or early April. They hatch 3-4 weeks later; fledging occurs in 34-36 days. Loss of habitat due to timber harvesting is causing a decline in their population trend. The Mexican subspecies (S.o. lucida) inhabits the region.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/r	Henry Mountains																		
	Yl/r	Abajo/Elk Ridge																		
	Yl/r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Caprimulgidae lesser nighthawk Chordeiles acutipennis		Indigenous	S	H					S			S	S	S	C	S			H	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Lesser nighthawks are often seen over ponds or perched on roadsides at desert elevations. Their population trend is unknown. Nesting occurs from May-July. Eggs are laid on bare ground and incubated for 18-19 days. The young fledge after 21 days. They feed primarily on insects, especially beetles.																				
common nighthawk Chordeiles minor		Indigenous	S	H		L	L	S	S	S	S	S	S	S	C				C	
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
These nongame birds are abundant at all elevations. Their population trend is stable. Flocks of nighthawks often congregate around riparian wetlands at dawn and dusk to feed on midges and other flying insects. From May-July, eggs are laid on the ground in open, sparsely vegetated areas. Old robin nests are sometimes utilized. Incubation lasts 19 days. The young will be able to fly after another 21 days.																				

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
common poorwill Phalaehoptilus nuttallii		Indigenous							H	C	C			S		S		S		
	Su/c	Wasatch Plateau	These nongame birds are found in open country of submontane ecological associations. Their population trend is stable. Nesting occurs from May-July. Eggs are laid on bare ground, rocks, or in gravel and incubated for 18 days. Young fledge at 4 weeks of age. Parents have been known to move young to different nest sites during the brooding period.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
Family: Apodidae white-throated swift Aeronautes saxatalis		Indigenous	S						S	S	S	S	S	S	C	S		S		
	Su/c	Wasatch Plateau	These nongame birds are found in desert and submontane ecological associations. Their population trend is unknown. Nests are twiggy brackets saliva-glued to crevices or caves in precipitous areas. Nesting occurs in June and July. These birds may often stray many miles away from their nesting and roosting sites in search of food. They feed almost entirely on flying insects caught in the air.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
black swift Cypseloides niger		Indigenous													C			C		
	Su/u	Wasatch Plateau	These insectivorous, nongame birds prefer open areas of montane elevations but are also found at sub-montane elevations. Populations arrive in mid May and remain until October. They are crepuscular hunters of flying insects. Algae or moss nests are built in crevices of moist mountain cliffs and are often located behind waterfalls. Nesting occurs in June and July with a 24-27 day incubation period. Young stay in the nest until fledged at 45-49 days of age. Their population trend is unknown.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
Family: Trochilidae black-chinned hummingbird Archilochus alexandri		Indigenous	H	C					C	C			H					C		
	Su/c	Wasatch Plateau	Black-chinned hummingbirds reside near water in semi-arid country of desert and submontane eco-logical associations. The population trend of these nongame birds is unknown. They appear by April and remain until early October, or as long as there are ample flowers in bloom. Nests are tiny feltlike cups in shrubs or trees. Peak nesting occurs from May through June. Two to three broods may be raised with the female incubating the eggs for 16 days. Young fledge at 2-4 weeks of age. Hummingbirds feed on flower nectar and small insects.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
magnificent hummingbird (Eugenes fulgens)		Indigenous	C	H	C															
	k	Wasatch Plateau	These nongame birds prefer to inhabit weeded canyons and glades of montane elevations. Nesting occurs from May through July. Silky plant fibers and mosses are used to structure nests on horizontal branches. Egg incubation requires 16 days and the young probably fledge after an additional 20-26 days. Flower nectar availability tends to limit species distribution. Their population trend is unknown.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
broad-tailed hummingbird *Selasphorus platycercus*		Indigenous	H	C		C	C	H	S	H	H	S	S	H						C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
			The population trend of these nongame birds is unknown. They occur at all elevations. Lower valleys are utilized in April and May, while nesting occurs near streams at higher elevations. Depending on the availability of flower nectar, the birds will generally nest in June and July. Nests are lichen-covered cups located in trees or shrubs. A 14-17 day incubation period is followed by a 21-26 day nestling time. Management practices that provide small forest openings with edge appear beneficial to this bird.																	
rufous hummingbird *Selasphorus rufus*		Indigenous	S	S	H	H	H		H	H										H
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			Rufous hummingbirds occur at submontane and montane elevations. These nongame birds are present in the region from mid June to late September. Their population trend is unknown. These birds nest colonially in trees or shrubs and form cup-shaped nests covered with lichen. Nesting occurs from April-July. Eggs hatch after 12-14 days of incubation and the young fledge in another 20 days. Flower nectar availability limits species distribution.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
calliope hummingbird Stellula calliope		Indigenous			C	H	H	H		C				H			C	C		
	Su/u	Wasatch Plateau	These nongame birds inhabit canyons and forest openings of submontane and montane zones during summer. During migration riparian zones at all levels are utilized. Their population trend is unknown. Nesting occurs from May-August. Nests are lichen-covered cups built in shrubs. The eggs are incubated for 15-16 days. Fledging occurs at 18-23 days of age. These birds feed on flower nectar and are limited to areas abundant with this food source.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
Family: Alcedinidae belted kingfisher Ceryle alcyon		Indigenous															C	C	C	
	Yl/u	Wasatch Plateau	The population trend of these nongame birds is unknown. They occur at all elevations. Forested wetland areas with clear, shallow fishing waters provide critical habitat. Nesting burrows are excavated in earth banks that generally rise 4 ft. above the water, thus providing protection from predators. These birds are intolerable of human activity and often desert their nests. Nesting occurs from March-May. Both parents will incubate the eggs (22-24 days) and raise the young to fledging after another 23 days.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Yl/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Picidae northern flicker Colaptes auratus		Indigenous	H	C		S	C	C		H	C									C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
			These nongame birds occur at all elevations. Open or lightly wooded ground is critical for feeding and and nesting. Their diet consists of ants, other insects, fruits, and berries. They are often seen foraging on the ground. Nest holes are excavated in dead trees or limbs. Cottonwoods and aspens are often utilized. Breeding begins in March and nesting occurs in May and June. Both parents incubate the eggs for 11-14 days. The young can fly at 25-28 days of age. The population trend of the northern flicker is stable.																	
*pileated woodpecker Dryocopus pileatus		Indigenous	S			C	C	C												C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/r	Henry Mountains																		
	Tr/r	Abajo/Elk Ridge																		
	Tr/r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/r	Canyonlands																		
			These nongame woodpeckers are important predators of many bark-eating beetles. They are found in isolated areas of submontane and montane elevations. Mature coniferous and deciduous forests with many snags comprise preferred habitat. Despite destruction of their habitat by agriculture and logging, some are gradually adapting to wooded suburbs. Their population trend is unknown.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
red-headed woodpecker *Melanerpes erythrocephalus*		Indigenous	S	H		S	S	S			H							C		
	Su/u	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
*Lewis woodpecker *Melanerpes lewis*		Indigenous		C				C		S								C		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		

These nongame birds prefer open areas at all elevations. They feed on mast (nuts, acorns), fruit, insects, and young birds. In June, nests are excavated in a tree, stump, or pole. Creosote coated poles are lethal to the eggs and nestlings. Eggs are incubated for 12 to 13 days and the young can fly after another 27-30 days. Nesting competition may be high where starling populations are dense. Their population trend is unknown.

These nongame birds occur at all elevations, but prefer park-like ponderosa forests for breeding. The occurrence of insects and a brushy understory determines the choice of nesting sites. Nests are built in tree cavities in May and June. These birds are not adept at excavating these cavities, so either dead trees or existing cavities are critical to their breeding habitat. Both sexes incubate the eggs for 2 weeks. The young are fledged after an additional 28-34 days. These woodpeckers feed on insects, nuts, and berries. Their population trend is unknown.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
downy woodpecker Picoides pubescens		Indigenous	H	C		C	C	H		S	H									C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
		These nongame birds feed on insects, fruit, seeds, and mast. They occur at all elevations. Nests are excavated at the tops of dead trees in open woodlands. New cavities are excavated each year, preferably in the same tree. Nesting occurs from May-July, although courtship begins in late winter. Eggs are incubated for 3 weeks and fledging occurs in another two weeks. In winter, these birds tend to move to lower elevations.																		
three-toed woodpecker Picoides tridactylus		Indigenous				C	H	H												C
	Yl/u	Wasatch Plateau																		
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
		These nongame woodpeckers exhibit a strong preference for the bark insects of spruce trees. These woodpeckers inhabit coniferous forests at submontane and montane elevations. Nesting occurs from June through July. Nests are excavated each year in standing dead trees. Eggs are incubated for 14 days and fledging requires another 22-26 days. One brood will be raised. Their population trend is unknown.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
hairy woodpecker Picoides villosus		Indigenous	S			C	C	C		S	C									C
	Yl/c	Wasatch Plateau	These nongame birds occur at all elevations. They feed upon borers, caterpillars, and other insects. Preferred nesting areas are mountain forests and valley woodlands. Nests are built in dead trees from May-July. The female will build the nest and then incubate the eggs for 11-12 days. The young will leave the nest after an additional 12-13 days. The population trend of the hairy woodpecker is unknown.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
*Williamson's sapsucker Sphyrapicus thyroideus		Indigenous				C	C	C		S	H									H
	Su/r	Wasatch Plateau	These nongame birds display altitudinal migration between submontane and montane elevations in response to seasonal food habits. For most of the year they feed entirely on the sap and phloem of live conifers. During breeding the diet shifts almost entirely to insects. Nest cavities are excavated in conifers from May-June, and territories are established. Eggs are incubated for 14 days and the young fledge at 21-28 days of age.																	
	Su/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
yellow-bellied sapsucker *Sphyrapicus varius*		Indigenous			C	C	C		S	H										C
	Yl/c	Wasatch Plateau	These nongame birds are insectivorous. They occur at all elevations but tend to migrate to lower altitudes for the winter. Nesting occurs in tree cavities from April-July. The same tree is often utilized each year, but new cavities are sometimes excavated. Both sexes incubate the eggs for 12-13 days and fledging occurs after another 25-29 days. Their population trend is unknown.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
Family: Tyrannidae olive-sided flycatcher *Contopus borealis*		Indigenous			C	H	C	S												C
	Su/u	Wasatch Plateau	These nongame birds are seen at all elevations from mid May to October. They are often seen perched on the tips of dead trees or branches. The population trend of this species is unknown. Nests are twiggy saucers built on conifer branches. Nesting occurs from June to mid July. The incubation period is usually 16-17 days and the young fledge at 21-23 days of age. Flycatchers feed primarily on flying insects.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
western wood-peewee Contopus sordidulus		Indigenous				C	C	C		C	C							C		
	Su/c	Wasatch Plateau	These insectivorous, nongame birds occur at all elevations. They prefer broken wooded areas where dead trees or trees with dead limbs are present. Their population trend is unknown. Nests are lichen covered cups located on horizontal branches. Nesting occurs from May through July. The females incubate the eggs for 12 days and the young fledge at 14-18 days of age. One brood is raised each year.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
western flycatcher Empidonax difficilis		Indigenous				C		C		C	C							C		
	Su/c	Wasatch Plateau	These nongame birds occur at all elevations. Water and shade are limiting factors. Their population trend is unknown. During the June-July nesting season, they are found in canyons flanked with cliffs. Nests are moss cups, built 30 feet high on structures, ledges, cut banks, and tree trunks. Eggs incubate for 14-15 days. Two broods are raised each year with the young fledging at 14-18 days of age. Insects are taken on the wing.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Hammond's flycatcher *Empidonax hammondii*		Indigenous				C	C	C												C
	Su/u	Wasatch Plateau	These insectivorous, nongame birds inhabit montane ecological associations. Nests are made of woven plant fibers and located out on limbs. These birds nest from May-July. The incubation period is 13-15 days. One brood is raised each year. Young generally fledge at 17-18 days of age. Their population trend is unknown.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
dusky flycatcher *Empidonax oberholseri*		Indigenous				H	C	H	C	C	H									C
	Su/c	Wasatch Plateau	These nongame, insectivorous birds occur at submontane and montane elevations. They nest at mid elevations where there is ample brush or tall shrubs, or meadow communities surrounded by dense forests. Grass nests are built in willows, alders, etc. The nesting season is from May-July. The incubation period is 15-16 days. Fledging requires 18 days.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) c[illegible]ional[illegible] acc[illegible]al; ([illegible] unkno[illegible] to inh[illegible] area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
willow flycatcher Empidonax traillii		Indigenous		L													C	C		
	Su/c	Wasatch Plateau	These nongame birds occur at all elevations. They have been known to breed at elevations up to 7,000 feet. These birds nest in willow and alder thickets from May-July. Nests are loose grass cups. The female incubates the eggs for 13-15 days and fledging lasts another 12-14 days. Their diet consists mostly of insects taken on the wing.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
gray flycatcher Empidonax wrightii		Indigenous														C	H	C		
	Su/u	Wasatch Plateau	Gray flycatchers inhabit the submontane ecological association. The population trend for this nongame species is unknown. Nesting occurs in May and June in shrubs and trees of sagebrush and pinyon-juniper ecosystems. Nests are made of woven cups of grass. The incubation period is 14 to 15 days. Two broods are raised each year and fledge in 16 days. Food consists primarily of insects caught in the air.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
black phoebe Sayornis nigricans		Indigenous	H	H								C			C			C		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
		Black phoebes inhabit precipitous terrain at desert and submontane elevations. Although common residents, they are perhaps sporadic in the winter. Their population trend is unknown. Nests are cups of mud and grass built near water on ledges, bridges, or buildings. The incubation period is 15-17 days. Two to three broods are usually raised and fledge in 2-3 weeks. They forage almost entirely on flying insects.																		
eastern phoebe Sayornis phoebe		Indigenous	H	H											C			C		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
		Eastern phoebes frequent various desert and submontane ecological associations. They are often sighted around farm buildings and bridges with nearby water. Nest sites are located on man-made structures or cliffs. Eggs are incubated for 16 days and the young fledge in another 15-16 days. Their population trend is unknown. They feed mainly on insects, but occasionally fruit and small reptiles are taken.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Say's phoebe Sayornis saya		Indigenous	S	C					S	S	C	C	C	S	C					H
	Yl/c	Wasatch Plateau	These nongame birds prefer areas with low shrubs or scattered trees at desert and submontane elevations. Their population trend is unknown. Nests are cups or brackets of mud, moss, or grass located on structures, ledges, or rock walls. Nesting occurs from May through July. They will usually raise two broods, incubating each for about 2 weeks. The young will fledge at 14-16 days of age. Adults feed primarily on flying insects, but occasionally fruit and small reptiles are taken.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
ash-throated flycatcher Myiarchus cinerascens		Indigenous	H	H					C	H	C	C	C	S						C
	Su/c	Wasatch Plateau	These nongame birds move around constantly over large areas of desert and submontane elevations. Nests are built in cavities of trees, yuccas, mesquite, and wooden posts. Nesting occurs in May and June. The female incubates the eggs for 15 days and the young are fledged at 14-16 days of age. As the name suggests, their principle food is flying insects. Their population trend is stable.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown lo inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
eastern kingbird Tyrannus tyrannus		Indigenous	L	C					S	C	C	S	S	S						C
	Su/c	Wasatch Plateau	These nongame birds inhabit desert and submontane ecological associations. Their conspicuous nesting habits seem to have contributed to reductions in their abundance. Their population trend is unknown. Nests are bulky, twiggy, neatly lined saucers.. They are built on shrubs, tree stumps, or man-made structures. The birds nest from May through July. They will incubate one brood for 11-13 days. The young fledge at 16-18 days of age. Eastern kingbirds feed on insects.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
western kingbird Tyrannus verticalis		Indigenous	H	C					S	C	C	S	S	S						C
	Su/c	Wasatch Plateau	These nongame birds inhabit desert and submontane elevations with scattered trees. They nest in deciduous, isolated woodlands along the lower valley streams. Nests are bulky, twiggy, neatly-lined saucers which are built in shrubs, trees, or man-made structures. Nesting occurs in May and June. Occasionally, two broods will be raised. Incubation by the female requires 12-14 days. The young fledge in another 16-17 days. Kingbirds feed primarily on flying insects. The population trend is stable.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Cassin's kingbird Tyrannus vociferans		Indigenous	H	C				H	S	C	C			S						C
	Su/u	Wasatch Plateau	These nongame birds occur at submontane and montane elevations in semi-open areas of scattered trees. These birds often live in association with the western kingbird. They are seen in southeastern Utah from April to November. Nesting occurs from May-July. Nests are made of twigs, grass, and wool. They are often built out on tree limbs. The incubation period is 12-14 days. Young fledge in another 16-17 days. Their population trend is unknown.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
Family: Alaudidae horned lark Eremophila alpestris		Indigenous	H	C	H				S			S		C				H		
	Yl/c	Wasatch Plateau	Horned larks are a nongame species with an unknown population trend. They are found at desert and montane elevations. These birds are largely terrestrial, seldom alighting in shrubs or trees. Nests are grass-lined depressions on the ground. The nesting season is from February-June. Two to three broods will be raised. The females incubate the eggs for 11 days and are easily flushed from the nest when disturbed. The young are ready to leave when they are 9-12 days old. Seeds and insects comprise the primary food items.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Hirundinidae cliff swallow Hirundo pyrrhonota		Indigenous	H	C												C	H	H	C	C
	Su/c	Wasatch Plateau	These nongame, insectivorous birds inhabit cliffs of desert and submontane ecological associations. They arrive in April and remain until October. Colonial nesting occurs on cliffs, buildings, and bridges from May-July. Both sexes will incubate the eggs for 15 days. The young fledge after another 21-24 days. Occasionally, two broods are raised. Their population trend is unknown.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
barn swallow Hirundo rustica		Indigenous	H	C												C	H	H	C	C
	Su/c	Wasatch Plateau	These insectivorous nongame birds inhabit desert and submontane areas from April to November. Their population trend is unknown. Nesting occurs singly or in small groups, depending on the availability of nest sites. Nests are mud baskets lined with feathers and are stuck to a cliff or structure. Nesting occurs from May-August with an incubation period of 15 days. The young leave the nest at 17-24 days of age.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*purple martin Progne subis		Indigenous			H	C	H	S							C		S	H		
	Su/r	Wasatch Plateau																		
	Su/r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		
bank swallow Riparia riparia		Indigenous			H										C	H	H	C	C	C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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The population trend of this nongame species is unknown. They inhabit montane elevations. Colonial nesting occurs in tree cavities, cliff niches, or nesting boxes. House sparrows and starlings compete for nest cavities with the martins. The nesting season spans the months of May through July. Incubation requires 15-16 days followed by a 26-31 day nestling period. Purple martins feed primarily on flying insects.

These nongame birds occur at all elevations from late March to mid October. They are especially conspicuous in late August when they fly into trees or willow patches to roost for the night. Their population trend is unknown. Colonial nesting occurs from May-July. They excavate nest burrows in river bank cliffs. Both sexes incubate the eggs for 15 days. The young remain in the nest for 19 days. These birds are often seen soaring over open country in search of insects.

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
northern rough-winged swallow *Stelgidopteryx serripennis*	Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	These nongame, insectivorous birds occur at desert and submontane elevations. Their population trend is unknown. Nests are usually constructed from May-July in banks, caves, or crevices along waterways. Both singular and colonial nesting may occur. Both parents incubate their single brood for 16 days. Fledging requires 19-21 days.												C		C			
tree swallow *Tachycineta bicolor*	Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c Su/c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	Tree swallows inhabit all ecological associations where there is open country and water. They occur from mid February to September. Their population trend is unknown. Nests are usually constructed in cavities from May-July. Mountainous habitats where dead trees and snags border waterways are preferred. feather-lined nest cups may also be located in building or nest boxes. Eggs are incubated for 13-16 days and the young fledge at 16-24 days of age. Flying insects are the principle food.	H	C		H	C	H							H	H	C	S	S

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
violet-green swallow Tachycineta thalassina		Indigenous	H	C		H	C	C	S						C	H	H	C	S	S
	Su/c	Wasatch Plateau	The population trend of these nongame birds is unknown. They can be found at all elevations. Nesting usually occurs from May-July at the higher elevations. Nests are constructed in cavities of aspen trees, rocky ledges, or buildings. These swallows sometimes compete for nesting holes with tree swallows. One brood will be raised with a 2 week incubation period and 16-24 day fledging time.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
Family: Corvidae scrub jay Aphelocoma coerulescens		Indigenous	S	S					C	C								H		
	Yl/c	Wasatch Plateau	These nongame birds are found at desert and submontane elevations. Their population trend is unknown. Nests are constructed of twigs and built in shrubs or trees. Nesting occurs in May. Eggs are incubated for 16 days. Young fledge after another 18-19 days. Their diet consists of insects, fruits, and seeds, as well as the eggs and young of other bird species.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
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Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
American crow Corvus brachyrhynchos		Indigenous	S	C		H	H	H		S	S			H						C
	Tr/o	Wasatch Plateau																		
	Tr/o	Tavaputs Plateau																		
	Tr/o	Cedar Mountain																		
	Tr/o	Henry Mountains																		
	Tr/o	Abajo/Elk Ridge																		
	Tr/o	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	Tr/o	Burr Desert																		
	Tr/o	Cisco Desert																		
	Tr/o	Canyonlands																		
			Common crows are considered a nongame species. Although migratory, a few may linger throughout the winter, congregating in roosts. They inhabit ecosystems of all elevations. Crows are scavengers, feeding primarily upon road killed animals.																	
common raven Corvus corax		Indigenous	S	C	S	C	C	C	S	H	H	S	S	S	C	S	H	H		
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
			These nongame birds are usually found at all ecological associations. Their population trend is unknown. Large nests are built of sticks, bones, and wool and located at the tops of conifers and utility poles or on cliff ledges. They nest from April-June. Incubation lasts 18-21 days. The young can fly at 5-6 weeks of age. Ravens are primarily scavengers but also eat insects, garbage, seeds, fruits, bird eggs, and nestlings.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Steller's jay Cyanocitta stelleri		Indigenous	S			C	H	C		C								H		
	Yl/c	Wasatch Plateau	These nongame birds are usually found at montane elevations. However, during the winter, a few birds may descend to submontane elevations. Nesting occurs from May-June. Bowl shaped nests are formed with twigs, rootlets, and pine needles and located in conifers. The incubation period is 17-18 days. The fledging time is unknown. The young will remain with their parents for their first year. Jays are omnivorous, consuming insects, berries, nuts, and seeds. They often scavenge at campsites. Their population trend is unknown.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
pinyon jay Gymnorhinus cyanocephalus		Indigenous	S					H	S	H	C							S		
	Yl/c	Wasatch Plateau	These omnivorous, nongame birds usually appear as family groups or small, loosely organized flocks that wander restlessly over large areas at all elevations. Their population trend is unknown. Nesting is colonial in pinyon, junipers, or oak, and nests are well-lined, bulky twig bowls. Nesting occurs in April and May. Incubation lasts 16-17 days. Young are fledged in 3 weeks. These birds will return to the same breeding grounds year after year.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Clark's nutcracker Nucifraga columbiana		Indigenous			C		C			H			H							
	Yl/c	Wasatch Plateau	These nongame birds occur at submontane and montane elevations. They frequent subalpine forests but may move to lower elevation ponderosa and pinyon-juniper ecosystems in the fall and winter. Their population trend is unknown. Nests are deep, grass-lined bowls of twigs located 7 to 150 feet up in conifers. Nesting occurs in March and April with an incubation period of 16-18 days. The young fledge in another 18-21 days. These birds feed primarily on nuts but have been known to steal and beg for food at campsites.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
gray jay Perisoreus canadensis		Indigenous			C		C			H			H							
	Yl/u	Wasatch Plateau	Gray jays are nongame birds that occur at montane elevations. They are dependent upon the subalpine forests of the high altitudes but will move to submontane elevations for the winter. Their population trend is unknown. Nests are structured with twigs, lined with moss or feathers, and located 4 to 30 feet high in conifers. Nesting occurs from March through May. Incubation lasts 16-18 days and fledging requires 15 days. They are omnivorous and feed upon insects, berries, nuts, and seeds.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
			Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
black-billed magpie		Indigenous	S	C	S	L	L	L	S	C	C	S	S	S			S	S	C	
Pica pica	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
Family: Paridae		Indigenous	H	H		C	C	C	H	C	S								C	
black-capped chickadee	Yl/c	Wasatch Plateau																		
Parus atricapillus	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Yl/c	Canyonlands																		

The population trend of these nongame birds is stable. They are often found in small groups at all elevations. Nesting is often colonial and occurs from April-June. Nests are huge, domed masses of sticks built in willow thickets, trees, or shrubs. The females will incubate one clutch of eggs for about 18 days. The young fledge at 22-28 days of age. These birds are omnivorous and often feed upon road kills.

These nongame, omnivorous birds occur at all elevations. They tend to inhabit low elevation riparian ecosystems during the winter and ascend to coniferous-deciduous forests for breeding. Nesting occurs from March-June. Nests are constructed in natural tree cavities. The females incubate the eggs for 12-13 days. The young are fledged after another 15-16 days. They will disperse a few weeks later and will not return to their birth place. The population trend of this species is unknown.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
mountain chickadee Parus gambeli		Indigenous	H	H		C		C			C									
	Yl/c	Wasatch Plateau	These nongame birds occur at all elevations. Breeding occurs at submontane and montane elevations. They winter at desert riparian areas. Heavy clearcutting can have adverse effects on the chickadees. Their population trend is unknown. They nest in tree cavities during May and June. The incubation period lasts two weeks and fledging occurs three weeks later. Their diet consists of insects, insect eggs and larvae, seeds, and berries.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Yl/c	Canyonlands																		
plain titmouse Parus inornatus		Indigenous								H	C									S
	Yl/u	Wasatch Plateau	The plain titmouse is a nongame species that occurs at submontane elevations. Their population trend is unknown. They nest in tree cavities from April through June. The female is not easily flushed from the nest during the 14-16 day incubation period. The young fledge at 16 days of age. When not breeding, dense foliage is important for resting. The birds primarily feed on insects but also eat seeds, acorn mast, and berries.																	
	Yl/u	Tavaputs Plateau																		
	Yl/u	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	Yl/u	San Rafael Desert																		
	Yl/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Aegithalidae bushtit Psaltriparus minimus		Indigenous		C						C	C							C		
	Yl/c	Wasatch Plateau	These nongame birds are often seen in straggly flocks at desert and submontane elevations. Their population trend is unknown. Nests are elongated woven pouches built in trees or shrubs. Nesting occurs from late April through July. It has been reported to take anywhere from 13-51 days to build the nest. Incubation normally last 12-13 days. The young are fledged after another 12-14 days. Nests are deserted when disturbed, however the birds may renest. They feed on insects, seed, and berries.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
Family: Sittidae red-breasted nuthatch Sitta canadensis		Indigenous	S			C	H	C										H		
	Yl/c	Wasatch Plateau	These nongame birds are found exclusively in montane forests. Timber harvesting has proven to be detrimental to populations of the birds. Their population trend is unknown. Nests are built in cavities of conifer snags, the entrance of which is smeared with pitch. Nesting takes place in May and June with a 12 day incubation period. Just one brood is raised. Young fledge in 2-3 weeks. In the winter, these birds may display altitudinal migration in search of conifer seeds. They feed on insects during the summer.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
white-breasted nuthatch Sitta carolinensis		Indigenous				C	C	C		H	H									C
	Yl/c	Wasatch Plateau	These nongame birds are found at all elevations. They nest in cavities from May through July. Cavities are also common roost sites. Both parents will incubate (12 days) and feed the young. Pair bonding is sometimes permanent. The young are fledged at 2 weeks of age. Nests are built 2 to 60 feet high in tree cavities and snags. Nuthatches eat bark, insects, seeds, nuts, and fruit.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
pygmy nuthatch Sitta pygmaea		Indigenous				C	C	C												C
	Yl/c	Wasatch Plateau	These nongame birds inhabit montane elevations. They often occur as large flocks in mature stands of ponderosa and aspen forests. Nesting occurs from May to early August. Nests are located in tree cavities which are also used for winter roosting. Materials such as bark, wool, feathers, and plant down are used to line the nests. The eggs incubate for 14-15 days and the young are fledged after an additional 20-22 days. The diet of these birds consists of insects and conifer seeds.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Certhiidae brown creeper Certhia americana		Indigenous	S			C	C	C		H									C	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
Family: Troglodytidae canyon wren Catherpes mexicanus		Indigenous	S	S	H				S	S	S	S			C				H	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

Brown creepers occur at all elevations. They spend the summer in montane coniferous forests and descend to lower elevations in the winter. These nongame birds are often solitary. They nest under loose strips of bark from May-July. The female will incubate the eggs for 14 to 15 days. Both parents will feed the young until they leave the nest at 14-16 days of age. These birds will renest if disturbed. They probe for bark insects and their eggs or larvae. Their population trend is unknown.

Canyon wrens inhabit cliffs at all elevations. The population trend of these nongame birds is unknown. Nests are cups of twigs or moss built in rock crevices or buildings. Canyon wrens nest from April through July. The female incubates the eggs for 12 days. Fledging occurs after an additional 13 days. Nests will be reused each year. These birds are insectivorous.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
marsh wren Cistothorus palustris		Indigenous														C				
	Su/l	Wasatch Plateau	These insectivorous nongame birds require cattail marsh habitats of desert and submontane elevations. Their population trend is unknown. Nests are coconut-shaped grass balls that are attached to marsh reeds. Males often build dummy nests. Nesting occurs from May-July. Incubation lasts 12-16 days. Nestlings leave the nest after two weeks. They will establish their own territories at different marshes.																	
	Su/l	Tavaputs Plateau																		
	Su/l	Cedar Mountain																		
	Su/l	Henry Mountains																		
	Su/l	Abajo/Elk Ridge																		
	Su/l	LaSal Mountains																		
	Su/l	Dolores Triangle																		
	Su/l	San Rafael Desert																		
	Su/l	Burr Desert																		
	Su/l	Cisco Desert																		
	Su/l	Canyonlands																		
rock wren Salpinctes obsoletus		Indigenous	H			S	S	S	S	S	S	C			S					
	Yl/c	Wasatch Plateau	Rock wrens are indigenous to rocky outcrops of all elevations. The population trend of this nongame species is unknown. Rock wrens are insectivorous. Nests are usually built in rock crevices out of grass and moss. Nesting occurs from April through July. Two to three broods are often raised. Three to 10 eggs are laid, one a day, after which there is a 14 day incubation period. Fledging occurs after another 14 days. After breeding, many of the birds move to high elevations, but they will spend the winter at lower elevations.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Bewick's wren Thryomanes bewickii		Indigenous							S	H	C	L								C
	Yl/c	Wasatch Plateau	Bewick's wrens are nongame birds that inhabit desert and submontane elevations. Their population trend is unknown. Although cavity nesters, they use sites prepared by other birds. Nesting occurs from April-July. The female incubates the eggs for 14 days. The young leave the nest at 35 days of age. Bewick's wrens forage on the ground and in low, dense shrubs for insects and spiders.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
house wren Troglodytes aedon		Indigenous	H	H		C	C			H										C
	Su/c	Wasatch Plateau	This nongame species can be seen at all elevations from April through October. Their population trend is unknown. Nesting occurs from May to early July. Nests are built in tree cavities, under loose bark, and in abandoned buildings or bird boxes. Eggs are incubated for 13 days and the nestling period lasts 12-18 days. Wrens feed upon a variety of insects.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Cinclidae American dipper Cinclus mexicanus		Indigenous																C	C	
	Yl/c	Wasatch Plateau	These nongame birds occur at submontane and montane elevations. During winter they are dependent upon riparian areas of fast-flowing mountain streams. They search the bottom of streams for aquatic invertebrates, small fish, and insects. The population trend is unknown. Nests are bulky spheres of moss built behind waterfalls or under stream-banks, bridges, and ledges. Courtship begins in February. Eggs are laid in March and incubated for 13 to 17 days. The nestlings fledge after another 18-25 days.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Muscicapidae blue-gray gnatcatcher Polioptila caerulea		Indigenous							S	C	C									C
	Su/c	Wasatch Plateau	These nongame birds occur at desert and submontane elevations. Their population trend is unknown. Small lichen-covered nests are located on tree limbs. These birds nest from April-June and both adults will incubate the eggs for 13 days. Nestlings will fledge at 10-12 days of age. The birds feed on insects, insect eggs, and larvae. Chaining has been shown to have adverse effects on their populations.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
ruby-crowned kinglet Regulus calendula		Indigenous	S			C	S	C	S	S	S							C		
	Yl/c	Wasatch Plateau	These nongame birds summer in montane forests and descent to desert and submontane ecosystems in the winter. Their population trend is unknown. Nests are suspended 2 to 50 feet up in conifer trees. During the June and July nesting season, the female incubates the eggs for 12 days. The young are probably ready to fly after another 12 days. Clearcutting and selection harvesting have adverse effects on these birds. Ruby-crowned kinglets are insectivorous.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
golden-crowned kinglet Regulus satrapa		Indigenous				C	S	C	S	S	C							C		
	Yl/u	Wasatch Plateau	This nongame species summers in montane forests and moves to submontane ecosystems during the winter months. The population trend of these birds is unknown. Nests are moss balls (with the entrance at the top) built in conifers. The birds will not tolerate habitat changes during their June and July nestling season. Incubation and fledging each require about 2 1/2 weeks. These birds catch insects in the air as well as on twigs.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
veery Catharus fuscescens		Indigenous																C		
	Su/u	Wasatch Plateau	Veeries (willow thrushes) are nongame birds that occur from April until late July at desert and submontane elevations. Their population trend is unknown. From May-July, nests are built on or near the ground. The female incubates the eggs for 11-12 days and the young are ready to fly after another 10 days. Veeries feed primarily on insects during the breeding season and on fruits in late summer and fall.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
hermit thrush Catharus guttatus		Indigenous	H		C	H	C	S	C	C			C					H		
	Su/c	Wasatch Plateau	These nongame birds inhabit submontane and montane elevations. Their population trend is unknown. Their nests are made of moss, twigs, or grasses and are usually built in shrubs or trees. They nest from mid May to mid July. Both incubation and nestling periods last 12 days. The birds feed on fruit and insects. Clearcutting practices can be harmful to these birds.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Swainson's thrush Catharus ustulatus		Indigenous				C	C	C										C		
	Su/c	Wasatch Plateau	These nongame birds occur from mid April through August at submontane and montane elevations. Their population trend is unknown. They nest in tall shrubs, conifers, and aspens in June and July. Nest cups are formed from grass, moss, twigs, rootlets, and dead leaves. The females incubate the eggs for 2 weeks and the young are fledged in another 10-13 days. Food consists of fruit and insects.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
varied thrush Ixoreus naevius		Indigenous	S			S	S	S		S	S							C		
	k	Wasatch Plateau	Varied thrushes inhabit forests at submontane and montane elevations. The population trend for these nongame birds is unknown. They forage for insects, worms, and fruit.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Wt/o	Henry Mountains																		
	Wt/o	Abajo/Elk Ridge																		
	Wt/o	LaSal Mountains																		
	Wt/o	Dolores Triangle																		
	k	San Rafael Desert																		
	Wt/o	Burr Desert																		
	k	Cisco Desert																		
	Wt/o	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Townsend's solitaire Myadestes townsendi		Indigenous				C	H	C		C	C									C
	Yl/c	Wasatch Plateau	These nongame birds nest in montane areas and winter at desert and submontane elevations. Their population trend is unknown. Nests are cups of grass and pine needles that are well hidden on the ground among rocks, in stumps, banks, or cliffs. Although little is understood about their breeding biology, nesting occurs from mid May to mid July. These birds catch insects in the air or pounce on them from their perches. They rely on berries for winter survival.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
mountain bluebird Sialia currucoides		Indigenous	S	C	H	C	C	C	C	C	H	C		H						C
	Yl/c	Wasatch Plateau	This nongame species inhabits all elevations. Montane and submontane forests interspersed with grasslands are utilized during the summer months while lower elevation habitats are used during the winter. Their population trend is unknown. They are secondary cavity nesters, utilizing natural or abandoned tree cavities. Nesting occurs in June with a 13 day incubation period. The young are fledged after another 22-23 days. This species often hovers above its prey, particularly insects, before dropping to catch them.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
eastern bluebird		Indigenous															L			
Sialia sialia	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Wt/a	Canyonlands																		

In December, 1989, a single specimen of this nongame species was sighted at the Moab Marsh, a desert ecological association. In its normal range, the species preferred habitat consists of open country with scattered trees.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*western bluebird Sialia mexicana		Indigenous	S	C		H	C	C		H	H								H	
	Yl/r	Wasatch Plateau	These nongame birds occur at all elevations. They appear from March to mid August. Their population trend is unknown. Nests are located in dead tree cavities or bird boxes. Nesting takes place in June with a 14 day incubation period and fledging occurs 22-23 days later. Bluebirds feed on insects caught on the ground or on the wing.																
	k	Tavaputs Plateau																	
	k	Cedar Mountain																	
	Yl/r	Henry Mountains																	
	Yl/r	Abajo/Elk Ridge																	
	Yl/r	LaSal Mountains																	
	Wt/r	Dolores Triangle																	
	Wt/r	San Rafael Desert																	
	Wt/r	Burr Desert																	
	k	Cisco Desert																	
	Yl/r	Canyonlands																	
American robin Turdus migratorius		Indigenous	H	C		H	C	H		C	C			C			C	C	
	Yl/c	Wasatch Plateau	American robins occur at all elevations. The population trend is unknown for this nongame species. Relative abundance during the winter may vary depending upon the availability of berries, fruits, insects, and worms. Nests are mud-walled, grass-lined bowls, that are usually located in trees. However, these birds may also nest in man-made structures. Nesting occurs from mid May to mid July. Two to three broods are raised each year, with incubation periods of 14 days. The young can fly at 14-16 days of age.																
	Yl/c	Tavaputs Plateau																	
	Yl/c	Cedar Mountain																	
	Yl/c	Henry Mountains																	
	Yl/c	Abajo/Elk Ridge																	
	Yl/c	LaSal Mountains																	
	Yl/c	Dolores Triangle																	
	Yl/c	San Rafael Desert																	
	Yl/c	Burr Desert																	
	Yl/c	Cisco Desert																	
	Yl/c	Canyonlands																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Mimidae gray catbird Dumetella carolinensis		Indigenous									S							C		
	Su/u	Wasatch Plateau	These nongame birds inhabit desert and submontane elevations. Their population trend is unknown. Nests are built close to the ground in dense undergrowth where foraging also occurs. This species prefers habitats with an open overstory. Adults are omnivorous, whereas the young feed almost entirely on insects. Nesting occurs in June and July. The incubation period is 12-13 days and the young can fly after another 11-13 days.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		
northern mockingbird Mimus polyglottos		Indigenous	H	C					C			C	C					H		
	Su/u	Wasatch Plateau	These nongame birds inhabit desert and submontane elevations. Nests are bulky, twiggy, rootlet-lined cups located on or near the ground in thickets or dense tree stands. Nesting occurs from April through July. Usually, two broods are raised with incubation periods of 12-13 days. The young can fly after another 11-13 days. Mockingbirds feed in the thickets or on the ground where they consume insects and fruit.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
sage thrasher Oreoscoptes montanus		Indigenous							C	H	S							H		
	Yl/c	Wasatch Plateau	These nongame birds inhabit submontane elevations. Their population trend is unknown. Nesting occurs from mid May to mid July. Nests are bulky cups of bark strips and grasses built about 1 to 3 ft. up in sagebrush shrubs. Both sexes incubate the eggs for 15 days, and the young can fly after an additional 11-14 days. This species forages on the ground for insects and fruit.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
Bendire's thrasher Toxostoma bendirei		Indigenous	H						H			C	C					H		
	k	Wasatch Plateau	These nongame birds are found at desert elevations. They have an unknown population trend. Nesting occurs from March through July in thorny shrubs. Little else is known of this thrasher's breeding biology. They feed primarily on insects, although fruits are also eaten.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/o	Dolores Triangle																		
	Su/o	San Rafael Desert																		
	Su/o	Burr Desert																		
	Su/o	Cisco Desert																		
	Su/o	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
brown thrasher Toxostoma rufum		Indigenous								H	C	H								C
	k	Wasatch Plateau	Brown thrashers inhabit submontane areas, often close to human habitation. These nongame birds have an unknown population trend. Nesting occurs from May through July. Nests are bulky twig cups located on the ground or in thickets. The eggs are incubated for 12-13 days, and the young are fledged after another 9-13 days. Brown thrashers forage on insects and fruit.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Yl/u	Dolores Triangle																		
	k	San Rafael Desert																		
	Yl/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
Family: Motacillidae water pipit Anthus spinoletta		Indigenous	C	C										C			C	C		
	Yl/c	Wasatch Plateau	These nongame birds occur at all elevations and sometimes form large flocks. They nest in the alpine zone and winter at lower elevation areas. Their population trend is unknown. Nests are grassy cups located on the ground. Nesting begins in April. Incubation lasts 14 days, and the young are ready to leave the nest after another 16 days. The birds feed on aquatic invertebrates, insects, and seeds.																	
	Wt/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Bombycillidae cedar waxwing Bombycilla cedrorum		Indigenous	H	C					S		H						C		C	
	Wt/c	Wasatch Plateau																		
	Wt/c	Tavaputs Plateau																		
	Wt/c	Cedar Mountain																		
	Wt/c	Henry Mountains																		
	Wt/c	Abajo/Elk Ridge																		
	Wt/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Wt/c	Canyonlands																		
Bohemian waxwing Bombycilla garrulus		Indigenous	H	C					S		C								C	
	Wt/u	Wasatch Plateau																		
	Wt/u	Tavaputs Plateau																		
	Wt/u	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		

Cedar waxwings are nongame birds that inhabit desert and submontane elevations. They occur from November to May, and their population trend is unknown. Although breeding has not been documented, some are present in the summer months. In other areas, they construct nests from twigs and moss. Incubation lasts for 12-13 days and often two broods will be raised. The young have fledged after 16 days. These birds frequently flock with Bohemian Waxwings.

These nongame birds are widely dispersed throughout all ecological associations. Waxwings occur from from November through May. Large flocks frequent urban areas where there is an ample supply of berries on ornamental shrubs or dried fruit left on trees. Their population trend is unknown.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Laniidae		Indigenous		C					C			C	H	C		H		C		
northern shrike	Wt/u	Wasatch Plateau																		
Lanius excubitor	Wt/u	Tavaputs Plateau																		
	Wt/u	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		
loggerhead shrike		Indigenous		C					C		H	C	C							
Lanius ludovicianus	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

Northern shrikes prefer open country of desert and submontane elevations. These nongame birds appear from mid August through March. Their population trend is unknown. These "butcher birds" impale their prey of insects and small mammals on thorns or barbed wire.

These carnivorous, nongame birds inhabit desert and submontane elevations. They are often seen perched on posts, wires and trees. Their population trend is unknown. Nests are well-lined cups built in shrubs or trees. The birds will renest if the first site is disturbed or destroyed. Nesting occurs from May through July with an incubation period of 16-17 days. They young are fledged after another 17-21 days but will still be fed by the parents for 3-4 weeks. Habitat loss and pesticide use have had detrimental effects on populations.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Sturnidae European starling Sturnus vulgaris		Exotic	H	C																C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
			European starlings inhabit desert and submontane ecological associations. Although insectivorous, these nongame birds have also been known to forage on grain, causing economic losses to farmers. They are gregarious birds, however, they have been known to nest both colonially and singly. Tree cavities are preferred nest sites during the April-July nesting season. The birds are strong competitors with other cavity nesters. Both parents incubate the eggs for 12 days and the young will have fledged after an additional 20-22 days.																	
Family: Vireonidae warbling vireo Vireo gilvus		Indigenous	S			S	C	S												C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
			Warbling vireos inhabit montane zones. These nongame birds appear from late March-October. Their population trend is unknown. Nests are tiny cups generally located 20 to 50 ft. up in trees. Nesting occurs from May through July with both sexes incubating the eggs for 12-14 days. The young will have fledged after another 16 days. These birds forage for insects in the upper crowns of trees. Wild berries and seeds may also be taken. Pesticides have reduced the populations of these birds.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accid[illegible]l; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa*	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
solitary vireo Vireo solitarius		Indigenous					C	C			H									C
	Su/c	Wasatch Plateau	These nongame birds occur from April to mid October at all elevations. Nests are neat baskets hung from low branches 5 to 12 feet up in trees. Nesting occurs from May through July with an incubation period of 14-15 days. The young are fledged after another 14 days. These insectivores are often victimized by brown-headed cowbirds.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
gray vireo Vireo vicinior		Indigenous					C	C	C											
	k	Wasatch Plateau	These nongame, insectivorous birds inhabit precipitous areas of submontane ecosystems. This species occurs from mid April through August. Their population trend is unknown. Nesting occurs from May through July. Eggs are incubated for 14-15 days in nests that are built low to the ground. Fledging is completed when the young are 2 weeks of age. Some chaining of their pinyon-juniper habitat can be beneficial by creating edge, however, large scale clearing can be damaging to populations.																	
	k	Tavaputs Plateau																		
	Su/r	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	Su/r	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wl) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Emberizidae yellow-rumped warbler Dendroica coronata		Indigenous	H			C	C	C		S	C									C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Tr/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Tr/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	Tr/c	Burr Desert																		
	Tr/c	Cisco Desert																		
	Su/c	Canyonlands																		
*Grace's warbler Dendroica graciae		Indigenous						C		H										
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

These nongame birds occur at all elevations. They frequent montane forests during the summer and move to lower elevation forests during migration. They build cup-shaped nests in conifer trees, using hair and feathers. Often, two broods will be raised in June and July with fledging completed at 8-10 days of age. Moderate timber harvesting can be beneficial to populations.

These nongame, insectivorous birds inhabit submontane and montane areas from mid April through September. Nesting occurs in May and June. Eggs incubate for 12-13 days and the young fledge after another 9-12 days. Nests are tiny cups located high in pines. These birds seem to tolerate moderate timber harvesting. Their population trend is unknown.

1. Seasonal status: (Yl) yearlong resident; (Wl) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
magnolia warbler Dendroica magnolia		Indigenous				S		S												
	Tr/r	Wasatch Plateau																		
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
Magnolia warblers are insectivores and inhabit montane coniferous forests. These birds visit southeastern Utah during spring and fall migrations and often accompany other warbler species. The population trend for these nongame birds is unknown.																				
black-throated gray warbler Dendroica nigrescens		Indigenous	S							C	C								C	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
These insectivorous nongame warblers occur at submontane elevations. They prefer to nest in the pinyon-juniper ecosystems and are found at riparian ecosystems during migration. Their population trend is unknown. Nests are neat cups held together with spider silk. They are built in shrubs or trees, usually within 10 feet of the ground. The birds nest from May through July. Eggs incubate for 10-13 days days and the young will remain with the parents beyond the 9-12 day nestling period.																				

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
																wetlands				
hermit warbler *Dendroica occidentalis*		Indigenous				C		H							C					C
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	k	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
			Hermit warblers nest at montane elevations but frequent all elevations during the spring and fall migrations. The population trend of these nongame birds is unknown. Nests are developed in May and June as cups high in conifers. Eggs incubate for about 12 days and the young will fledge in another 8-10 days. These warblers are quite active and forage for insects at heights up to 200 meters.																	
yellow warbler *Dendroica petechia*		Indigenous		H		C				C										C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
			These nongame birds appear from April through October at all elevations. Their population trend is unknown. Yellow warblers appear to be dependent on shrubs and secondary tree canopies for nesting. The birds utilize plant fibers, hair, and grasses for construction of their nests. Nesting occurs from May through July. Incubation of the eggs is carried out by the female and lasts eleven to twelve days. Both parents will raise the young until fledging at 9-12 days of age. Nests are often parasitized by the brown-headed cowbird.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited, (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Townsend's warbler *Dendroica townsendi*		Indigenous			L	C	L	C												H
	Tr/u	Wasatch Plateau	Townsend's warblers depend upon montane coniferous forests during their spring and fall migrations. They appear in May and again from August-November. Their population trend is unknown. This nongame species usually forages for insects in treetops but may move lower during migrations.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		
common yellowthroat *Geothlypis trichas*		Indigenous	H														C		C	
	Su/l	Wasatch Plateau	These nongame birds inhabit wetland riparian ecosystems of desert and submontane elevations. They appear from mid-April to October. Nesting occurs from May-August. Nests are large, loose grass cups built under shrubs in marshes. Nest building and incubation (11-13 days) are the responsibility of the female. Normally, two broods are raised each year and the young will fledge at 10 days of age. Polygamy has been observed in this species.																	
	Su/l	Tavaputs Plateau																		
	Su/l	Cedar Mountain																		
	Su/l	Henry Mountains																		
	Su/l	Abajo/Elk Ridge																		
	Su/l	LaSal Mountains																		
	Su/l	Dolores Triangle																		
	Su/l	San Rafael Desert																		
	Su/l	Burr Desert																		
	Su/l	Cisco Desert																		
	Su/l	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wl) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened, (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*yellow-breasted chat Icteria virens		Indigenous								S								C		
	Su/r	Wasatch Plateau	These nongame insectivorous birds inhabit dense thickets of riparian ecosystems at all elevations. Their population trend is unknown. Nesting occurs from May through July. Nests are large cups of grass and leaves well hidden 1 to 5 feet high in thickets. The incubation period is eleven days and the young fledge at eight days of age. The nesting birds do not appear to desert their eggs or young when disturbed. Brown-headed cowbirds appear to leave the nesting chats alone.																	
	Su/r	Tavaputs Plateau																		
	Su/r	Cedar Mountain																		
	Su/r	Henry Mountains																		
	Su/r	Abajo/Elk Ridge																		
	Su/r	LaSal Mountains																		
	Su/r	Dolores Triangle																		
	Su/r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/r	Canyonlands																		
MacGillivray's warbler Oporornis tolmiei		Indigenous	H			C			C									C		
	Su/c	Wasatch Plateau	These nongame birds occur at all elevations. Nests are grass cups placed in low brush 1 to 6 feet above the ground. Females incubate the eggs for 11-13 days. Young fledge in an additional 8-9 days. Nesting occurs from May through July. Foraging for insects generally occurs within 6 feet of the ground. The population trend of these birds is unknown.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accid[illegible]l; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
olive warbler Peucedramuds taeniatus		Indigenous				C												C		
	k	Wasatch Plateau	The olive warbler was sighted in the spring of 1985 at the junction of Fish and Owl Creek Canyons of San Juan County. These insectivorous birds generally dwell in coniferous forests and occur at submontane and montane elevations. The population trend is unknown for these nongame birds. Their nests are developed from May through July as thick cups of vegetation located high in conifers. Eggs incubate for 10-13 days. After hatching, there is a 9-12 day nestling period.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Su/o	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
norther waterthrush Seiurus noveboracensis		Indigenous														H	H	C		
	k	Wasatch Plateau	These nongame birds occur at all elevations. They frequent wetlands, particularly riparian areas. Their population trend is unknown. They feed on insects along the water's edge.																	
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	wetlands: Mesic Meadow	wetlands: Riparian	wetlands: Stream	wetlands: Lake
American redstart *Setophaga ruticilla*		Indigenous								H								C		
	Tr/u	Wasatch Plateau																		
	Tr/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
orange-crowned warbler *Vermivora celata*		Indigenous				H		C										C		
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

American redstarts prefer riparian areas of desert and submontane elevations. These nongame birds occur during spring and fall migrations. Their population trend is unknown. Their diet consists primarily of insects and occasional seed and berries.

Orange-crowned warblers occur at all elevations. They utilize riparian wetlands during spring and fall migrations. These nongame birds usually occur from late April to late November. Their population trend is unknown. Their nests are made of grass and roots and are typically hidden on the ground or in low shrubs. During May and June the female builds the nest over a 7-9 day period and then incubates the eggs for 11-12 days. Fledging occurs after another 12-13 days. Warblers feed primarily on insects.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (a) [illegible]

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Lucy's warbler Vermivora luciae		Indigenous																C		
	k	Wasatch Plateau	This nongame species inhabits desert elevations. They occur from late March to mid September. Their population trend is unknown. Nests are constructed between April and June as well-lined cups located in tree cavities or under loose bark. They have also been known to nest in stream banks. Incubation lasts 11-12 days. After hatching, the young will fledge in 9-12 days. Warblers are insectivorous.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	k	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		
Nashville warbler Vermivora ruficapilla		Indigenous																C		
	Tr/u	Wasatch Plateau	Nashville warblers frequent all elevations during spring and fall migrations. These nongame birds appear from May-September and nest from May-July. Nests are cups of grass and leaves that are well hidden on the ground. Incubation requires 11-12 days, and the females are easily flushed from the nest. Fledging requires another 9-12 days. Their population trend is unknown. These birds forage at all levels for insects.																	
	Tr/u	Tavaputs Plateau																		
	Tr/u	Cedar Mountain																		
	Tr/u	Henry Mountains																		
	Tr/u	Abajo/Elk Ridge																		
	Tr/u	LaSal Mountains																		
	Tr/u	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	Tr/u	Burr Desert																		
	k	Cisco Desert																		
	Tr/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Virginia's warbler Vermivora virginiae		Indigenous					H			C	C							C		
	Su/c	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
Virginia's warbler Vermivora virginiae: Virginia's warblers occur at desert and submontane elevations. They breed and nest in mountain brush and pinyon-juniper ecosystems. Riparian wetlands are utilized in the spring and fall. Nesting occurs from May-June. Eggs incubate for 10-13 days and the young fledge 9-12 days after hatching. Nests are built in dead leaves or loose soil under shrubs or clumps of grass. Caterpillars and small insects are their primary food sources. Their population trend is unknown.																				
Wilson's warbler Wilsonia pusilla		Indigenous		C	S	H	H			H								C		
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
Wilson's warbler Wilsonia pusilla: These insectivorous nongame birds occur at all elevations and display altitudinal migration. This species is found from mid March through October and nests from May through July. Thick underbrush and moist meadows are required for nesting. Nests are generally built on the ground or in low willow thickets. Eggs incubate for 10-13 days with the young fledging in another 8-11 days. Normally one brood is raised. This bird will not tolerate livestock use of nearby riparian areas during nesting.																				

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)														wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
western tanager		Indigenous	H			C	C	C		H									C	
Piranga ludoviciana	Su/c	Wasatch Plateau	These nongame birds occur at all elevations. They inhabit montane forests in the summer and nest in lower elevation riparian ecosystems. Urban areas are frequented during migration. Shallow nests are located on branches of pines, firs, and oaks. The height of the nesting season appears to be mid June. The female incubates the eggs for 13 days and is not easily flushed from the nest. One brood is raised, with the young fledging after two weeks. Western tanagers often visit feeders but also feed on insects.																	
	Su/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Tr/c	San Rafael Desert																		
	Tr/c	Burr Desert																		
	Tr/c	Cisco Desert																		
	Su/c	Canyonlands																		
blue grosbeak		Indigenous																	C	
Guiraca caerulea	k	Wasatch Plateau	Blue grosbeaks are found at desert and submontane riparian ecosystems. Their population trend is unknown. Nests are compact, deep cups, built in shrubs or low trees. Two broods are generally raised in May and June. The female incubates the eggs for 11-12 days. The young can fly after an additional 9-12 days. Blue grosbeaks feed on insects, fruit, and seeds.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
lazuli bunting Passerina amoena		Indigenous	H	H						H	H									C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		
		This nongame species inhabits all elevations. Hybridization with indigo buntings is known. Nests are loose cups of grass and leaves that are built in low shrubs near water. Generally, two broods are raised in early summer with the female incubating the eggs for 12 days. The young can fly at 10-12 days of age. These birds feed on seeds, insects, and fruit.																		
indigo bunting Passerina cyanea		Indigenous		H					C	C										C
	Su/u	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
		Indigo buntings inhabit desert and submontane elevations and are often seen perched on wires along roadsides. The population trend of this nongame species is unknown. These birds occur from May through August. They nest from May-September. Nests are formed as cups of grass and weeds and are built in shrubs. Incubation of the eggs by the female requires 12-13 days. The young fledge after another 9-10 days. Buntings are seed eaters but also consume insects and fruit. Parasitism by the brown-headed cowbird is a serious threat.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accid[illegible]; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands			
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rose-breasted grosbeak Pheucticus ludovicianus		Indigenous	S				C			S									C
	Su/o	Wasatch Plateau	These nongame birds inhabit ecosystems of all elevations. Their population trend is unknown. The nesting season spans the months of May-August. Nests are frail, flat saucers built in trees or shrubs. Both sexes build the nest and incubate (14 days) the eggs. Usually, just one brood is raised until fledging at 9-12 days of age. Grosbeaks eat insects, seed, and fruit.																
	Su/o	Tavaputs Plateau																	
	k	Cedar Mountain																	
	Su/o	Henry Mountains																	
	Su/o	Abajo/Elk Ridge																	
	Su/o	LaSal Mountains																	
	Su/o	Dolores Triangle																	
	k	San Rafael Desert																	
	k	Burr Desert																	
	k	Cisco Desert																	
	k	Canyonlands																	
black-headed grosbeak Pheucticus melanocephalus		Indigenous	H				L			C									C
	Su/c	Wasatch Plateau	These nongame birds inhabit all elevations and frequently are found in urban areas. Grosbeaks feed on insects, seeds, and fruit. Nests are frail, flat saucers built in trees or shrubs from May-July. The eggs are incubated for 12-13 days, and the young fledge in an additional 9-10 days. The male will care for the first brood while the female begins incubating the second.																
	Su/c	Tavaputs Plateau																	
	Su/c	Cedar Mountain																	
	Su/c	Henry Mountains																	
	Su/c	Abajo/Elk Ridge																	
	Su/c	LaSal Mountains																	
	Su/c	Dolores Triangle																	
	Su/c	San Rafael Desert																	
	Su/c	Burr Desert																	
	Su/c	Cisco Desert																	
	Su/c	Canyonlands																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Leconte's sparrow *Ammospiza lecontei*		Indigenous												S		S	S	S		
	k	Wasatch Plateau	These nongame sparrows are found in grasslands and wetland ecosystems at desert and submontane elevations. Their population trend is unknown. They feed on insects and seeds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	Tr/a	Abajo/Elk Ridge																		
	Tr/a	LaSal Mountains																		
	Tr/a	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	Tr/a	Cisco Desert																		
	Tr/a	Canyonlands																		
*grasshopper sparrow *Ammodramus savannarum*		Indigenous												C						
	k	Wasatch Plateau	Grasshopper sparrows are dependent upon the dry grasslands of the desert. This ecosystem has been severely impacted through overgrazing. Formerly a common summer resident, these sparrows occur now as transients and their population trend is unknown. Restoration of their native grasslands may reestablish grasshopper sparrows as summer breeders. They feed on insects and seeds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Tr/r	Dolores Triangle																		
	Tr/r	San Rafael Desert																		
	Tr/r	Burr Desert																		
	Tr/r	Cisco Desert																		
	Tr/r	Canyonlands																		

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
sage sparrow Amphispiza belli		Indigenous							C			C	S					C		
	Su/u	Wasatch Plateau	These nongame birds inhabit desert and submontane zones. They are seen from March through November. Nesting occurs from March through July. Nests are loose, grassy cups built in shrubs. Two broods are generally raised. The incubation period of the eggs is 13 days. Young are fledged after another 9-11 days. The population trend for these birds is unknown.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		
black-throated sparrow Amphispiza bilineata		Indigenous							C	H	H	C	C							
	Su/u	Wasatch Plateau	Black-throated sparrows inhabit desert and submontane ecological associations. These nongame birds arrive in mid April and remain until mid September. Their population trend is unknown. Nesting occurs from April-August. Nests are flimsy cups built in shrubs or cacti. The female is not easily flushed from the nest. The incubation period averages 21 days. Young remain in the nest an additional 21 days. Black-throated sparrows forage for insects.																	
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
lark bunting Calamospiza melanocorys		Indigenous		S					H			S	S	C						
	Tr/o	Wasatch Plateau																		
	Tr/o	Tavaputs Plateau																		
	Tr/o	Cedar Mountain																		
	Tr/o	Henry Mountains																		
	Tr/o	Abajo/Elk Ridge																		
	Tr/o	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	Tr/o	San Rafael Desert																		
	Tr/o	Burr Desert																		
	Tr/o	Cisco Desert																		
	Tr/o	Canyonlands																		
lapland longspur Calcarius lapponicus		Indigenous		C					H			H	H	H						
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Wt/o	Dolores Triangle																		
	Wt/o	San Rafael Desert																		
	Wt/o	Burr Desert																		
	Wt/o	Cisco Desert																		
	Wt/o	Canyonlands																		

Lark buntings frequent desert and submontane ecological associations. They sometimes appear sporadically as small flocks in agricultural areas. This nongame species is seen during spring (May) and fall (October) migrations. Their diet consists of insects and seeds.

Lapland longspurs frequent open habitats of desert elevations. These nongame birds are often associated with horned larks and snow buntings. Their population trend is unknown. Nests are grassy, feather-lined depressions on the ground. These birds eat mostly seeds but also take insects and fruit.

1. Seasonal status: (Yl) yearlong resident; (Wl) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
lark sparrow Chondestes grammacus		Indigenous							C			C	S	S						C
	k	Wasatch Plateau	These nongame birds are found at desert and submontane elevations where there are available perch sites. These birds appear from April through October. Their population trend is unknown. Nests are formed of grass, rootlets, and hair. They are usually built in or under shrubs. Nesting begins in late June. The female incubates the eggs for 11-12 days and will sometimes raise two broods. Nine to ten days are required for fledging. Sparrows are primarily seed eaters but also take insects and fruit.																	
	k	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
dark-eyed junco Junco hyemalis		Indigenous	S	S		C	C	H	S	C	S	S	S	S						H
	Yl/c	Wasatch Plateau	These nongame birds inhabit montane forests during the summer. In the winter, large flocks occur at any elevation. The population trend of these birds is unknown. They eat seeds, insects, and fruit. Nesting occurs from May-July. Females incubate their eggs for 12-13 days, and the young fledge at 9-13 days of age. Two broods will be raised. Nests, although usually built on the ground with grasses, forbs, and hair have been found in trees.																	
	Yl/c	Tavaputs Plateau																		
	Wt/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
swamp sparrow Melospiza georgiana		Indigenous			S												C	C	C	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		
Lincoln's sparrow Melospiza lincolnii		Indigenous			S									C		C		C		
	Su/u	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

Swamp sparrows inhabit desert wetlands and frequent agricultural communities during migration. They appear from September through mid May. Swamp sparrows are often found in large flocks of white-crowned sparrows. This nongame species feeds on insects and seeds.

These nongame birds occur in desert and submontane areas from March through October. Transients migrate from April-May and September-October. The population trend is unknown. Nests are grassy cups built in willows or other low-growing shrubs. Nesting occurs between May and July. The female incubates the eggs for about 13 days. Young fledge at 9-12 days of age.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
song sparrow Melospiza melodia		Indigenous															C		C	
	Yl/c	Wasatch Plateau	Song sparrows inhabit wetland ecosystems of all elevations. The population trend of these nongame birds is unknown. The breeding season occurs from February through August. Nesting occurs wherever there are thickets or emergent vegetation. Nests are formed as cups of grass. The female will incubate the eggs for 12-13 days. The nestling period lasts 9-16 days. Two to three broods may be raised. Song sparrows are secretive and their diet consists of seeds.																	
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
savannah sparrow Passercules sandwichensis		Indigenous	H				C			C	H	C			C			C		
	k	Wasatch Plateau	Savannah sparrows inhabit desert zones. This nongame species is found from March through September. Their population trend is unknown. Nests are grassy hollows on the ground. June is the most popular nesting month. The female incubates the eggs for 12 days, and she will raise two broods. She is not easily flushed from the nest. The young fledge at 7-14 days of age. Sparrows are primarily seed eaters, but may take other vegetable matter and insects.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*fox sparrow *Passerella iliaca*		Indigenous				C	C	C												C
	Su/u	Wasatch Plateau	These nongame birds inhabit riparian areas at all elevations. They occur from mid March through November and nest from May-July. Nests are feather-lined grass cups built in shrubs or on the ground. The female incubates the eggs for 12-14 days and will only raise one brood. The young can fly at 9-11 days of age. They are gregarious except during the breeding season. Their population trend is unknown. Diet consists primarily of seeds.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	Su/u	Cisco Desert																		
	Su/u	Canyonlands																		
green-tailed towhee *Pipilo chlorurus*		Indigenous			H				C	C	C			H						C
	Su/c	Wasatch Plateau	These nongame birds inhabit submontane and montane elevations from mid April to mid November. Their population trend is unknown. They nest during June in shrubby areas where there is dense cover. The incubation period is probably 12-13 days and the nestlings probably fledge after another 10-12 days. Nests made of grass and shredded bark are located on the ground. The female will desert the nest when an intruder is nearby. This species forages for seeds, insects, and fruit.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rufous-sided towhee Pipilo erythrophthalmus		Indigenous	H							C								C		
	Yl/c	Wasatch Plateau	These nongame birds inhabit desert and submontane elevations. Their population trend is unknown. Nesting occurs from April through September. Nests are firm cups of leaves and bark well hidden on the ground. The female will raise at least two broods. The incubation period is 12-13 days. Nestlings will fledge after an additional 10-12 days. These seed eaters forage on the ground.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
vesper sparrow Pooecetes gramineus		Indigenous	H						C	S	H	H	H	C						H
	Su/c	Wasatch Plateau	These nongame birds inhabit all ecological associations. Nesting occurs between April and October. Nests are built in the grass. It is generally the female that incubates the eggs for 12-13 days. Two broods are raised; the first in June, the second in July. The young fledge at 7-14 days of age. Sparrows eat seeds, insects, and fruit. This bird's population trend is unknown.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
American tree sparrow Spizella arborea		Indigenous	H	H						H	H			H				H		
	Wt/u	Wasatch Plateau																		
	Wt/u	Tavaputs Plateau																		
	Wt/u	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Wt/u	Canyonlands																		
			Tree sparrows inhabit desert and submontane zones. These nongame birds are seen from late September through April, often appearing with song sparrows and white-crowned sparrows. Their population trend is unknown. Tree sparrows are gregarious in the winter and often visit feeders.																	
Brewer's sparrow Spizella breweri		Indigenous		H					C		H	C	H	H						
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
			These nongame birds are associated with desert and submontane ecological associations. They occur from mid April through October. Their population trend is unknown. During late summer and fall they tend to congregate in flocks. Nesting occurs between May and July. Cup-like nests are built in sagebrush. Eggs incubate for 11-13 days, and fledging occurs after another 8-9 days. After the breeding season, these birds forage heavily in the agricultural ecosystem.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
chipping sparrow Spizella passerina		Indigenous	H	C	L	C	C	S	H	C	C	S	S	S				C		
	Su/c	Wasatch Plateau	These nongame birds inhabit all elevations. During migration they occur in flocks, particularly in sagebrush ecosystems. Their population trend is unknown. Their breeding season occurs from March through August. Nests are hair-lined cups located in trees or shrubs. These sparrows will sometimes raise two broods. The incubation period lasts 11-14 days followed by an 8-12 day fledging period. Chipping sparrows forage for seeds, insects, and fruit on the ground.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
white-throated sparrow Zonotrichia albicollis		Indigenous	H			H	H	H		H	H							H		
	k	Wasatch Plateau	White-throated sparrows occur at all elevations from October to mid May. These nongame birds are often found in the company of white-crowned sparrows or juncos. The population trend of this species is unknown. These birds congregate in small flocks in the autumn. White-throated sparrows forage for seeds, insects, and fruit.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	k	San Rafael Desert																		
	Wt/u	Burr Desert																		
	k	Cisco Desert																		
	Wt/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
golden-crowned sparrow *Zonotrichia atricapilla*		Indigenous	H	S					S	S	S	S	S	L				H		
	k	Wasatch Plateau	These nongame birds reside at desert and submontane elevations from October to mid April. They often flock with white-crowned sparrows. Their population trend is unknown. Their winter diet consists of buds and seeds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		
white-crowned sparrow *Zonotrichia leucophrys*		Indigenous	S	S	C	H	H	H	C	S	S	S	S	L				C		
	Yl/c	Wasatch Plateau	These nongame birds are found at all elevations. In the summer they inhabit forested ecosystems. In the winter they move to desert and submontane ecosystems. Their population trend is unknown. They forage on the ground for seeds, insects, and fruit. Nesting occurs between April and August. Nests are built in dense vegetation either on or near the ground. The female incubates the eggs for 11-16 days, and the young fledge in another 7-12 days. They probably only raise one brood.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Yl/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Harris' sparrow Zonotrichia querula		Indigenous	H	S					S	S	S	S	S	L						H
	Wt/u	Wasatch Plateau																		
	Wt/u	Tavaputs Plateau																		
	Wt/u	Cedar Mountain																		
	Wt/u	Henry Mountains																		
	Wt/u	Abajo/Elk Ridge																		
	Wt/u	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	Wt/u	Cisco Desert																		
	Wt/u	Canyonlands																		
			Harris' sparrows inhabit desert and submontane areas. These nongame birds occur from mid October through April, often accompanying white-crowned sparrows and juncos. They prefer riparian areas. The population trend of this species is unknown. They forage on the ground for seeds, insects, and fruit.																	
red-winged blackbird Agelaius phoeniceus		Indigenous	L	C												C	H	C		
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
			These nongame birds inhabit desert and submontane ecological associations. Their population trend is unknown. Nests are built in emergent vegetation, shrubs, and small trees along waterways. Nesting begins by late March or early April and is completed by mid July. At this time, these birds feed mainly on aquatic insects. Eggs are incubated for 10-12 days and the young fledge after another 11-14 days. After fledging, these birds tend to move into agricultural areas to forage on waste grain and seeds.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rusty blackbird Euphagus carolinus		Indigenous															C		C	
	Tr/o	Wasatch Plateau	Rusty blackbirds inhabit submontane wetlands. The population trend of these nongame birds is unknown. They are gregarious and are sometimes found in mixed flocks. Blackbirds eat insects and seeds.																	
	Tr/o	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Tr/o	Henry Mountains																		
	Tr/o	Abajo/Elk Ridge																		
	Tr/o	LaSal Mountains																		
	Tr/o	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Tr/o	Canyonlands																		
Brewer's blackbird Euphagus cyanocephalus		Indigenous	H	H													C		C	
	Yl/c	Wasatch Plateau	These nongame birds inhabit desert and submontane areas. They are often seen in small flocks. Their population trend is unknown. Nesting occurs from May through July and is sometimes loosely colonial. Nests are twiggy, grass-lined cups built on the ground, in shrubs, or in trees. Females incubate the eggs for 12-14 days. Usually two broods will be raised and the young will fledge at 13-14 days of age. Blackbirds feed on insects and seeds.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
northern oriole Icterus galbula		Indigenous	H	C																C
	Su/c	Wasatch Plateau																		
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
			Northern orioles inhabit desert and submontane areas. These nongame birds appear from May-September. Their population trend is unknown. Nests are made of fibers and formed into elongated pouches. They are constructed near the ends of branches between May and July. Females incubate their one brood for 12-14 days and fledging requires an additional 12-14 days. Northern orioles migrate during the day. They eat insects and seeds.																	
*Scott's oriole Icterus parisorum		Indigenous							S	C	C									
	k	Wasatch Plateau																		
	Su/u	Tavaputs Plateau																		
	Su/u	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	Su/u	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	Su/u	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		
			These nongame birds inhabit submontane areas. Grass nests are built during May or June in small trees or shrubs. The female incubates the eggs for 14 days, and she may raise two broods. The young are fledged after another two weeks. These birds feed on insects and seeds.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
brown-headed cowbird Molothrus ater		Indigenous	H	C							C						C		C	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
great-tailed grackle Quiscalus mexicanus		Indigenous	H																C	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Su/u	San Rafael Desert																		
	k	Burr Desert																		
	Su/u	Cisco Desert																		
	k	Canyonlands																		

These omnivorous, nongame birds occur at all elevations. Their population trend is unknown. Nesting occurs from April-July. They are parasitic, laying eggs in nests of other birds. There is evidence that the host nests must be near water and that perching sites be available from which the cowbird can observe the nest building. Eggs incubate for 10-12 days. The young are raised by the parents of the host nest. They can fly after 10 days. Areas used for livestock grazing provide favorable habitat.

These nongame birds prefer open desert areas with scattered trees. Increased irrigation practices have expanded their range. They feed on insects, lizards, eggs, and fruit. Nesting occurs from late May to early July with a 20-23 day incubation period and 13-14 day fledging time. Nests are mud-lined masses of grasses and rushes. They are located at least 2 feet above marshes or up to 50 feet high in trees.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened, (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
common grackle Quiscalus quiscula		Indigenous	H	H														H		
	Tr/a	Wasatch Plateau																		
	Tr/a	Tavaputs Plateau																		
	Tr/a	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	Tr/a	San Rafael Desert																		
	k	Burr Desert																		
	Tr/a	Cisco Desert																		
	k	Canyonlands																		
western meadowlark Sturnella neglecta		Indigenous		C					C			H	S	C						
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

Common grackles inhabit desert and submontane elevations. The population trend of these nongame birds is unknown. They are gregarious birds, roaming in mixed flocks in search of insects and seeds.

Western meadowlarks are a nongame species that occur at desert elevations. In the winter, these birds may flock in small numbers, particularly around cattle feeders. Their population trend is unknown. Nests are partially domed grass saucers, constructed on the ground in sagebrush and rabbitbrush areas. Two broods are raised during the April-July nesting season. There is a 13-15 day incubation period and 12 day nestling period. They feed on insects, fruit, seeds, and waste grain.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
yellow-headed blackbird Xanthocephalus xanthocephalus		Indigenous		S										S		C	C	C		
	Su/c	Wasatch Plateau	These nongame birds inhabit desert and submontane ecosystems from mid March to mid October. They forage in fields and open country. Their population trend is unknown. They only nest over standing water in emergent vegetation. Nests are fastened to cattails, bulrushes, or tall reeds. Nesting usually occurs in large colonies between May and June. Females incubate the eggs for 12-13 days after the second egg is laid. The young are fledged after another 9-12 days. Aquatic insects comprise the major food items.																	
	Su/c	Tavaputs Plateau																		
	Su/c	Cedar Mountain																		
	Su/c	Henry Mountains																		
	Su/c	Abajo/Elk Ridge																		
	Su/c	LaSal Mountains																		
	Su/c	Dolores Triangle																		
	Su/c	San Rafael Desert																		
	Su/c	Burr Desert																		
	Su/c	Cisco Desert																		
	Su/c	Canyonlands																		
Family: Fringillidae common redpoll Carduelis flammea		Indigenous	H																C	
	Yl/c	Wasatch Plateau	Common redpolls inhabit all elevations. More common north of this region, this nongame species is most abundant in March, but some are known to nest in May and June. Nests are constructed on the ground or in shrubs. Egg incubation lasts 10-11 days followed by a 12 day nestling period. Their population trend is unknown. These birds are gregarious. They frequent feeders, preferring rolled oats and hemp seeds, but will also forage on insects.																	
	Wt/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Wt/c	Henry Mountains																		
	Wt/c	Abajo/Elk Ridge																		
	Wt/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Wt/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
pine siskin Cardvelis pinus		Indigenous	H	H		C	H	C			H								C	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Yl/c	Canyonlands																		
lesser goldfinch Cardvelis psaltria		Indigenous	H	C															C	
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

pine siskin — Cardvelis pinus

The population trend of these nongame, submontane and montane inhabitants is unknown. Nests are formed of grass and twigs and located 8 to 30 feet high in conifers. The siskin's 13 day incubation period will often begin with the first egg to avoid freezing due to early April nesting. Most commonly, nesting occurs from May-July and there is a 14-15 day nestling period. This gregarious species often forms "winter finch" flocks. Pine siskins frequent feeders and favor millet.

lesser goldfinch — Cardvelis psaltria

Lesser goldfinches inhabit desert and submontane elevations. The population trend of these nongame birds is unknown. For most of the year, the birds are gregarious, but they tend to nest singly, in shrubs or trees. The nesting season occurs from late May to early July. The female will incubate the eggs for 12 days while the male feeds her at the nest. Two to three broods may be raised. The young fledge in 12-15 days.

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
American goldfinch *Cardvelis tristis*		Indigenous	H	C																C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
		American goldfinches inhabit desert and submontane ecosystems. The population trend of this nongame species is unknown. These birds tend to nest late, often well into August. The female incubates the eggs for 12-14 days while the male feeds her. The young fledge in another 11-17 days. Nests are neat cups located in shrubs and trees. American goldfinches are gregarious. They feed on seeds, insects, and fruit.																		
Cassin's finch *Carpodacus cassinii*		Indigenous	H		C	H	C		H	H										C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/u	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
		Cassin's finches nest in montane forests and flock to desert and submontane elevations in the winter. Nests are located in coniferous trees near meadows. Nesting occurs between May and July. The females incubate the eggs for at least 12 days. They will raise one or two broods. Nestlings will fledge at 2 weeks of age. If disturbed, even unfledged nestlings will desert the nest, resulting in mortality. Adults feed in treetops on seeds, insects, and fruit. Their population trend is unknown.																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
house finch Carpodacus mexicanus		Indigenous	H	C					H		C	H	H	H						C
	Yl/c	Wasatch Plateau																		
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		
			House finches inhabit desert and submontane elevations. The population trend of these nongame birds is unknown. Nesting occurs from March-July. Compact nests are often located near houses in shrubs, trees, or cacti. The females incubate the eggs for 13 days and will raise two broods. The young leave the nest after about 15 days. Often the same nest will be used each year. These birds are gregarious and often flock to feeders. They sometimes live in orchards and feed on ripened fruits.																	
evening grosbeak Coccothraustes vespertinus		Indigenous	H	H		C														H
	Wt/c	Wasatch Plateau																		
	Wt/c	Tavaputs Plateau																		
	Wt/c	Cedar Mountain																		
	Wt/c	Henry Mountains																		
	Wt/c	Abajo/Elk Ridge																		
	Wt/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/c	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Wt/c	Canyonlands																		
			These nongame birds are found from October to mid March at all elevations. Their population trend is unknown. This species is found in small flocks, feeding on buds and fruits of native and ornamental trees. Evening grosbeaks often frequent feeders, favoring sunflower seeds.																	

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

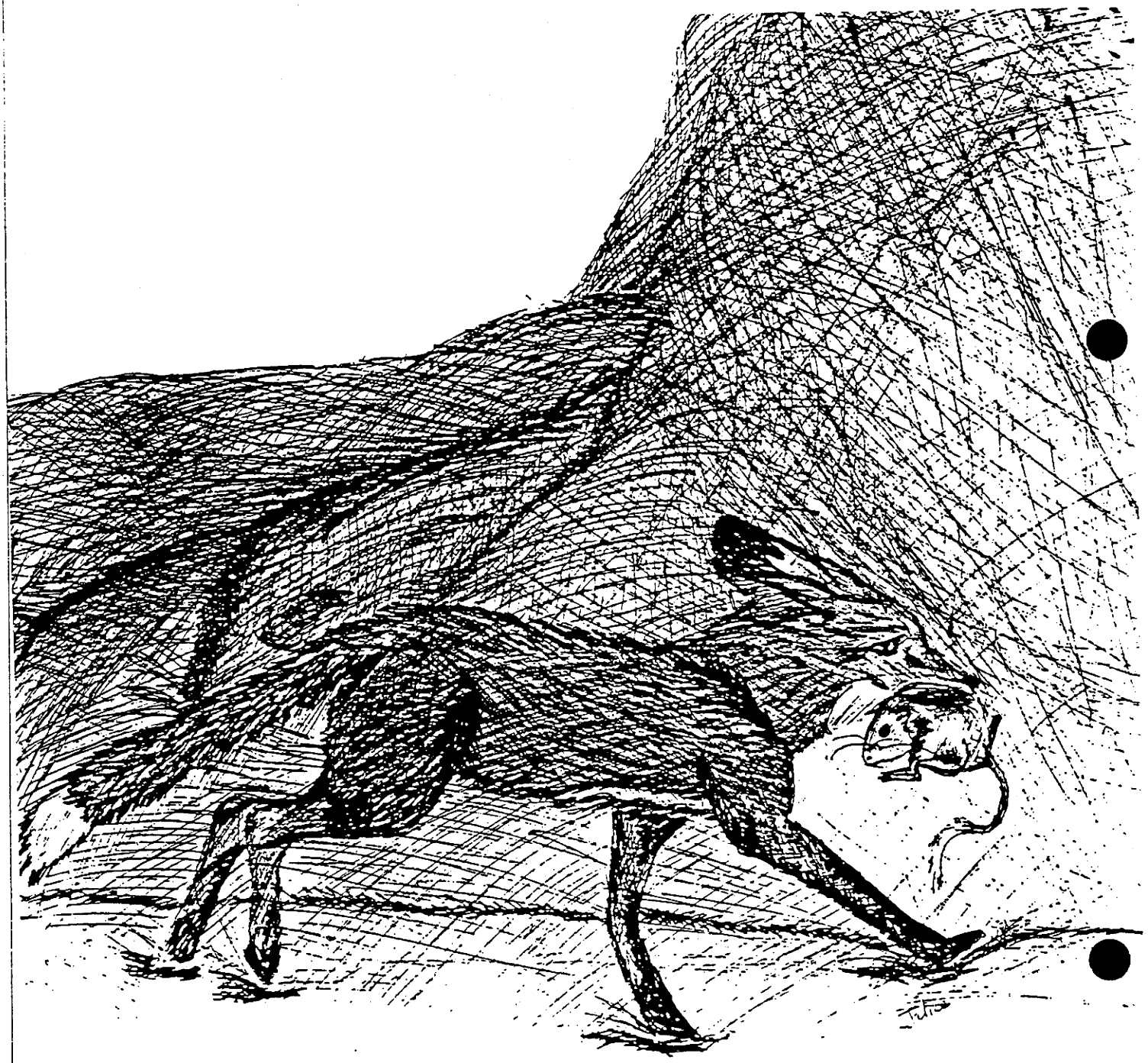
Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rosy finch Leucosticte arcota		Indigenous	S		C				S			S	S	S	C					
	Yl/u	Wasatch Plateau	These nongame birds inhabit alpine meadows in the summer and in the winter move to open country of all elevations. They require caves, crevices, or cavities for winter resting sites. Nesting occurs from June through August. Grass nests are built in rock crevices. Eggs are incubated for 12-14 days and the young fledge after another 16-22 days. Rosy finches catch insects on the wing. They feed near snowbanks and gather at feeders. Their population trend is unknown.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Wt/c	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/c	Burr Desert																		
	Wt/c	Cisco Desert																		
	Yl/c	Canyonlands																		
red crossbill Loxia curvirostra		Indigenous			C	C									C					
	Su/u	Wasatch Plateau	Red crossbills depend upon coniferous forests of montane elevations. These nongame birds occur from late May to late September and are often seen in small flocks. Their population trend is unknown. Nests are feather-lined saucers of twigs and moss located 5 to 20 feet high in conifers. Breeding occurs from January through July with a 12-18 day incubation period. The young will be able to fly after another 45 days. Seeds are extracted from pine cones with their crossed mandibles.																	
	Su/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Su/u	Henry Mountains																		
	Su/u	Abajo/Elk Ridge																		
	Su/u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	Su/u	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Avian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Seasonal Status[1] Relative Abundance[2]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
pine grosbeak Pinicola enucleator		Indigenous				C		C	H		H			H					S	
	Yl/u	Wasatch Plateau	These insectivorous, nongame birds are often associated with montane coniferous forests but during severe winters will inhabit riparian areas at desert and submontane elevations. The population trend of these nongame birds is unknown. This species usually nests in mature subalpine forests or the associated underbrush. One brood will be raised. Nesting occurs between May and July. The female incubates the eggs for 13-14 days and the nestling period lasts 13-20 days. Forest openings are foraged heavily during brooding.																	
	Yl/u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	Yl/u	Henry Mountains																		
	Yl/u	Abajo/Elk Ridge																		
	Yl/u	LaSal Mountains																		
	k	Dolores Triangle																		
	Wt/u	San Rafael Desert																		
	Wt/u	Burr Desert																		
	k	Cisco Desert																		
	Yl/u	Canyonlands																		
Family: Passeridae house sparrow Passer domesticus		Exotic	C	C																
	Yl/c	Wasatch Plateau	These nongame birds, also called English sparrows, were introduced into Utah sometime before 1870. Their population trend is stable and they inhabit desert and submontane elevations. Nesting occurs between April and September. Nests are bulky masses located in cavities or buildings. The birds will lay three clutches of eggs and the female will incubate them for 11-14 days. The young will leave the nest after another 15 days. These birds are gregarious. They feed on grain, fruit, seeds, garbage, and insects.																	
	Yl/c	Tavaputs Plateau																		
	Yl/c	Cedar Mountain																		
	Yl/c	Henry Mountains																		
	Yl/c	Abajo/Elk Ridge																		
	Yl/c	LaSal Mountains																		
	Yl/c	Dolores Triangle																		
	Yl/c	San Rafael Desert																		
	Yl/c	Burr Desert																		
	Yl/c	Cisco Desert																		
	Yl/c	Canyonlands																		

1. Seasonal status: (Yl) yearlong resident; (Wt) winter resident; (Su) summer resident; (Tr) transient
2. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

SOUTHEASTERN UTAH'S MAMMALS



Southeastern Utah's Mammals (Mammalian Species)

When pioneers arrived in Utah (1847) 110 species of mammals inhabited the southeastern region. Today (1990) there are 105 species. The Virginia opossum is an exotic and probably was not present in the state during early pioneer days. Impacts from man have not resulted in any specific species becoming extinct, but six species have been extirpated from the region. Two of these, the gray wolf (Canis lupus) and grizzly bear (Ursus arctos) are considered endangered in some areas where they still survive. Another species, the black-footed ferret (Mustela nigripes), is also endangered but may still inhabit environs within southeastern Utah.

The gray wolf and grizzly bear were targets for indiscriminate extermination efforts by early trappers and settlers. This killing had devastating effects on population levels and led to their extirpation from Utah. More recently, wildlife pest control efforts by agricultural interests was directed at prairie dogs. The demise of the black-footed ferret has been attributed to widespread extermination of prairie dog colonies, their primary food source.

Species not affected by extermination efforts often feel the pressures of human development in other respects. Many species utilize large home ranges. If they are disturbed to the extent that they vacate their home range, they may find surrounding locales already filled to capacity. In addition, migration routes may be disturbed by both human activities and artificial barriers. Species with small range sizes are also impacted from development as they do not have the capability to move great distances to new areas away from the source of stress.

Mammals at breeding or wintering areas are the most sensitive to disturbance. The animals are already under stress during these periods. Energy during the breeding season is directed towards mating activities and raising the young. During the wintering period energies are directed towards locating food and water supplies as well as staying warm. Project plans should be developed around these crucial time periods.

Table 5. Numbers (#) of mammalian species that now (1990) inhabit geographic areas and the proportion (%) of that total which inhabit each ecosystem by ecological association within southeastern Utah.

Geographic Areas (Elevation in feet)/#	Proportion (%) of species that inhabit each ecosystem by (1) Cold Desert (3,700–5,800 ft.); (2) Submontane (5,500–8,500 ft.); and (3) Montane (6,500–12,721 ft.) ecological associations.																																															
	UPLANDS																																															
	URBAN			AGRICULTURAL			ALPINE			SPRUCE/FIR			ASPEN			PONDEROSA			SAGEBRUSH/GRASS			MOUNTAIN BRUSH			PINYON/JUNIPER			SALTBUSH/GRASS			BLACKBRUSH			GRASSLAND			BARREN			WETLANDS											
																																								MARSH			MESIC MEADOW			RIPARIAN			STREAM			LAKE		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Wasatch Plateau (5,500–10,741)/80		25	19		30				23			50			46			51		66	46		66			68										51	36		65	24		29	25		28	24		76	58		4	6		4	5
Tavaputs Plateau (5,500–10,118)/79					29							50			47			53		71	47		72			76										48	39		43	27		29	25		27	23		80	58		4	6		4	5
Cedar Mountain (5,500–7,664)/58																				86			79			88										69			45			29			28			84			0			0	
Henry Mountains (5,500–11,506)/66					29				23			58			53			59		78	52		77			83							48			59	44		45	32		30	26		29	27		83	61		5	5		5	3
Abajo/Elk Ridge (5,500–11,362)/77		27			29				21			52			47			55		70	44		71			74							40			52	36		43	29		25	22		23	22		77	53		4	4		4	3
LaSal Mountains (5,500–12,721)/78		27			29				21			52			47			55		70	44		71			74							40			52	36		43	29		25	22		23	22		77	53		4	4		4	3
Dolores Triangle (3,937–7,428)/72				21	25														53	69			71			74		44			44	42		38	51		33	43		21	28		19	24		56	76		6	6		6	6	
San Rafael Desert (4,120–7,920)/72	26	28		35	32														64	75			68			71		54			47	47		53	61		29	38		25	28		24	31		61	76		6	6		6	6	
Burr Desert (4,500–6,522)/62	29			32															65	73			71			74		55			53	52		52	56		31	40		24	27		26	27		63	76		5	5		5	5	
Cisco Desert (3,937–5,300)/47	38			47															80									77						70			40			26			28			72			2			4		
Canyon[illegible]s (3,700–10,388)/85	24	24		27	32							46			41			47	55	71	41		[illegible]			68		47			44	39		45	53	33	27	40	24	20	25	22	19	22	20	53	72	51	5	[illegible]		5	5	4

Most mammals (72 to 84%) regardless of geographic area utilize the submontane riparian ecosystems. No doubt water and enhanced vegetation conditions in riparian zones account for this wildlife use. Also, a large percentage of mammals (66 to 88%) inhabit the mountain brush and pinyon/juniper ecosystems. These more xeric (dry) ecosystems provide sufficient berry and nut crops along with attractive cover to sustain wildlife populations (Table 5).

The submontane zone is intensively used by wildlife due in part to movement into or across this elevation by animals utilizing both desert and montane ecological associations. The submontane zone offers relatively stable and acceptable climatic conditions for many species.

It should be noted that the aspen ecosystem is considered to be of critical value to economically important large game species (moose, elk and deer). They "shade up" in the aspen type to reduce the potential of serious problems associated with heat prostration. Aspen also supports an excellent vegetation suitable for parturition and feeding areas.

Life requisite information in this section describes breeding seasons, gestation periods, and the time required for the young to disperse from the protection of parental care. Habitat requirements are also explored and should be used by land-use planners to effectively design projects with the least impact to the wildlife inhabitants.

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
				Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Didelphidae Virginia opossum Didelphis virginiana		Exotic																	C		
	k		Wasatch Plateau	North of Mexico, this nocturnal nongame animal is the only marsupial on the continent. They prefer riparian wetlands and are omnivorous. Frequent feeding on carrion causes many opossums to be killed on highways. Usually, opossums will raise two litters a year. Up to 12 young will be born to each litter. At 12-13 days of development, the young climb into the pouch where they will remain for two months. Southeastern Utah supports a population proximal to Green River town site at cold desert and submontane elevations.																
	k		Tavaputs Plateau																		
	k		Cedar Mountain																		
	k		Henry Mountains																		
	k		Abajo/Elk Ridge																		
	k		LaSal Mountains																		
	k		Dolores Triangle																		
	l		San Rafael Desert																		
	k		Burr Desert																		
	l		Cisco Desert																		
	k		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
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Family: Soricidae *desert shrew Notiosorex crawfordi		Indigenous																		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	r	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	r	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
			C	C	S	C	C	S								H				
These nongame mammals are found at cold desert and submontane elevations. Their population trend is unknown. Nests are made of fine vegetation or hair and are built beneath plants or debris. Three to five young are born in August. They will leave the nest after 40 days. Desert shrews can exist exclusively on water obtained from their food; primarily the soft inner parts of large insects. The primary predators on these shrews are owls.																				
masked shrew Sorex cinereus		Indigenous																		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
			S	L	S	L	S	S	S	S	S	S				H	C			
Masked shrews prefer montane riparian wetlands, but are found at all elevations. The population trend of these nongame animals is unknown. Up to four litters of 3-12 young are raised each year. Breeding occurs from April through October, however, it peaks in June and July. Nests are constructed of grass and dry leaves and are hidden under stumps, logs, or brush piles. Masked shrews feed on insects and small animals.																				

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
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Merriam's shrew Sorex merriami		Indigenous	H	S	H	H	C	S	L			H						C		
	u	Wasatch Plateau																		
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		
montane shrew Sorex monticolus		Indigenous	S	H	H	H	S	S	H	L	L	H		C	C	C				
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

Merriam's shrews are found at submontane and montane elevations. The population trend of these nongame animals is unknown. Little is known of the habits of this species, but they are probably similar to other shrews. Their diet includes insects and small animals. Observations have shown these shrews to have litters of about six young. Large, odorous glands on the male (prominent from April to June) are used to attract females and possibly repel predators.

These nongame mammals inhabit all elevations. Their population trend is unknown. Nests are located in stumps, logs, or beneath debris. Three to twelve young are usually born in July, although high altitude populations in Montana have reproduced in March and April. This species feeds on insects, insect larvae, spiders, snails, and other invertebrates.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*dwarf shrew Sorex nanus		Indigenous			C	C	C	C	C	S	S					C	C	H	C	
	k	Wasatch Plateau																		
	r	Tavaputs Plateau																		
	r	Cedar Mountain																		
	r	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	r	San Rafael Desert																		
	r	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
			Dwarf shrews prefer open areas of submontane and montane elevations. They are often found in clearcuts or alpine rockslide areas. The population trend of this nongame species is unknown. Breeding begins early in the year, and shrews may have more than one litter; the first between late July and early August, and the second a month later. Small, round nests are constructed of shredded vegetation and concealed under leaves, rocks, logs, or in burrows. These voracious feeders consume soft-bodied insects and spiders.																	
northern water shrew Sorex palustris		Indigenous														C	C	C		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
			Northern water shrews are associated with submontane and montane wetland ecosystems. Their population trend is unknown. Nests built of vegetation, sticks, leaves, and hair are hidden in debris or beaver dens. Up to three litters of 4 to 8 young are born from February to June. These shrews are excellent swimmers and can actually run short distances on the water surface or the stream bottom. They feed primarily upon small aquatic organisms and are preyed upon by weasels, snakes, birds, and fish. They have also been found caught in fish traps.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
vagrant shrew Sorex vagrans		Indigenous			H									H		H	C	C		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
Family: Vespertilionidae pallid bat Antrozous pallidus		Indigenous	H						H	H	H	H	H		C				H	
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)

Vagrant shrews inhabit submontane and montane elevations. The population trend of these nongame animals is unknown. Breeding occurs from January through May and again in October or November. Most will only raise one litter of 2-9 young a year. The gestation period is about 20 days. Nests are constructed of grass and dry leaves hidden in stumps or logs. Vagrant shrews are omnivorous.

These nongame animals are most commonly found in a variety of desert and submontane habitat types where suitable roosts exist. Diurnal roosts are usually in rock crevices and buildings, but occasionally mines, caves, and hollow trees are utilized. Nursery colonies begin forming in April, and the young are born in late May or June. Young bats can fly in 33 to 36 days. The pallid bat feeds on both terrestrial and flying insects. Their population trend is decreasing.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
big brown bat Eptesicus fuscus		Indigenous	H			H	H	H		H	H				C				C	
	c	Wasatch Plateau	Big brown bats are found in forested ecosystems at submontane and montane elevations. Single bats or small colonies roost and hibernate in caves, mine tunnels, rock crevices, hollow trees, or buildings. Nursery colonies form by April. Young are born from May to June and can fly at 3 weeks of age. These nongame bats prey on insects. However, in the winter they depend on fat reserves. Insecticide and pesticide use seems to have harmed their populations.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
*spotted bat Euderma maculatum		Indigenous	S						S	S	S	S	S		C				C	
	k	Wasatch Plateau	These nongame bats are solitary except for clustering during hibernation. They inhabit cold desert and submontane zones. Spotted bats are crepuscular/nocturnal and insectivorous. Breeding occurs soon after emergence from the hibernaculum and the birth of a single young occurs in June or July. They are dependent upon cliffs for roost/hibernation areas. Spotted bats do not migrate and use a hibernaculum that maintains a constant above freezing temperature from September to May.																	
	r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Allen's big-eared bat *Idionycteris phyllotis*		Indigenous				S	S	S		S	S				C				H	
	k	Wasatch Plateau	These nongame bats inhabit submontane and montane elevations. They are probably one of the rarest bats in North America, and southeastern Utah's population is limited to certain areas of the region. Their population trend is unknown. Caves and mines of the forest serve as roost and nursery sites. A single young is probably born in July. These opportunistic feeders consume insects.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
silver-haired bat *Lasionycteris noctivagans*		Indigenous	L			H	H	H							C	C	C	C	C	C
	c	Wasatch Plateau	These nongame bats inhabit montane forested ecosystems nearby water. Their population trend is unknown. Tree cavities usually serve as diurnal roosts, however, during migration roost sites may vary. Mating occurs in August and September. Generally, two young are born in June or July. They can fly after 3-4 weeks. Colonies hibernate in various places during the winter. Silver-haired bats forage in the evening for insects. Deforestation can reduce roosting habitat, thereby adversely affecting populations.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accident[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*red bat Lasiurus borealis		Indigenous									C				C	S	S	C		
	r	Wasatch Plateau	These nongame bats are solitary except for nursery colonies of females. They inhabit the submontane zone and are crepuscular/nocturnal as well as insectivorous. Breeding occurs during August or September. Fertilization is delayed and birth of up to four young occurs in June or July. Young can fly within three weeks. They probably do not migrate and instead utilize hibernaculums that maintain constant, above freezing temperatures between September and May. Roost sites are in wooded areas and caves.																	
	r	Tavaputs Plateau																		
	r	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
hoary bat Lasiurus cinereus		Indigenous									C	C						C		
	u	Wasatch Plateau	Hoary bats are found in submontane wooded ecosystems. Their population trend is unknown. Hoary bats spend the summer days hanging in trees or shrubs. In late May or June, two young are born following a fall and winter breeding season. Young can fly in about 34 days. This species often migrates south for the winter, although some may hibernate. These nongame bats emerge in late evening to primarily hunt moths.																	
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
California myotis Myotis californicus		Indigenous	H			S	S	H	H	H	H	H	H	H	C					H
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
long-eared myotis Myotis evotis		Indigenous	H			C	C	C			C				C					C
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accident; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
small-footed myotis Myotis ciliolabrum		Indigenous	H			C	C	C	S	S	C	S	S	S	C					C
	u	Wasatch Plateau	These nongame bats are usually found in or near forested ecosystems at all elevations. The preferred ecosystem is ponderosa pine. Night roosts include caves, rock crevices, and mine tunnels. Single young are born from May-July after a 60 day gestation period. They can fly after 3 weeks. In winter, these bats hibernate alone or in small groups. This species is nocturnal and insectivorous. Their population trend is unknown.																	
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		
little brown bat Myotis lucifugus		Indigenous	H			S	S	S	S		S	S	S	S	C					C
	c	Wasatch Plateau	These nongame insectivorous bats are found at all elevations. Their population trend is unknown. Colonies roost in caves, mine tunnels, hollow trees, or buildings. These nocturnal animals often hibernate in the winter. Young are born from May to June in hot, dark, stagnant retreats called nursery colonies. They can fly and feed on their own after 3 weeks.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	wetlands: Mesic Meadow	wetlands: Riparian	wetlands: Stream	wetlands: Lake
				Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
fringed myotis Myotis thysanodes		Indigenous		H						S	H	H	S	S	S	C					H
	u	Wasatch Plateau																			
	u	Tavaputs Plateau																			
	u	Cedar Mountain																			
	u	Henry Mountains																			
	u	Abajo/Elk Ridge																			
	u	LaSal Mountains																			
	u	Dolores Triangle																			
	u	San Rafael Desert																			
	u	Burr Desert																			
	u	Cisco Desert																			
	u	Canyonlands																			
				Fringed myotis reside in caves, mines, rock crevices, and buildings at desert and submontane elevations. The population trend of these nongame bats is unknown. Young are born in June and July and are capable of flight in less than 3 weeks. The bats migrate south in September and will return to Utah in May. They forage at night for insects. Pesticides have adverse effects on fringed myotis populations.																
long-legged myotis Myotis volans		Indigenous		H		S	S	S	H	S	S	H	H		C						H
	c	Wasatch Plateau																			
	c	Tavaputs Plateau																			
	c	Cedar Mountain																			
	c	Henry Mountains																			
	c	Abajo/Elk Ridge																			
	c	LaSal Mountains																			
	c	Dolores Triangle																			
	o	San Rafael Desert																			
	o	Burr Desert																			
	o	Cisco Desert																			
	c	Canyonlands																			
				These nongame bats inhabit all elevations. The population trend of these highly adaptable animals is unknown. During the day they roost in buildings, rock crevices, trees, and mines. Female nursery colonies are formed in the spring. There is a 50-60 day gestation period and a single young is born between June and August. These bats forage nocturnally over water and in forest openings.																

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Yuma myotis Myotis yumanensis		Indigenous	H						S	H	H	S	S	S	C					H
	u	Wasatch Plateau																		
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		
			Yuma myotis are found near permanent water at desert and submontane elevations. Their population trend is unknown. Colonies roost in caves, mines, and bridges. During the summer, males roost solitarily but females form large colonies. Single young are born in late May or June after a 40 day gestation period. They can fly after 4 weeks. This nongame species will abandon areas if disturbed.																	
western pipistrelle Pipistrellus hesperus		Indigenous	H						S	H	H	S	S	S	C					H
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
			Western pipistrelles are commonly seen in canyons at desert and submontane elevations. The population trend of these nongame bats is unknown. Nest sites and diurnal roosts include rock crevices, mines, caves, and buildings. Hibernation is a solitary activity. Breeding occurs from September-March. Usually 2 young are born in June. Western pipistrelles are crepuscular and opportunistic feeders of insects.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Townsend's big-eared bat Plecotus townsendii		Indigenous	L			S	S	S	L	S	S	L	L	L	C				H	
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
Although their population trend is unknown, these nongame bats are threatened with extirpation because of increased human disturbance to caves. They occur at all elevations. Colonial behavior occurs in nurseries and during hibernation. A single young is born in late May or early June. They may leave the caves with adults at 6 weeks of age. These bats are nocturnal foragers in search of moths.																				
Family: Molossidae *big free-tailed bat Nyctinomops macrotis		Indigenous	L						S			S	S	S	C				H	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	r	Cisco Desert																		
	r	Canyonlands																		
These nongame bats roost in caves, mine tunnels, bridges, and attics at desert elevations. Some roosts are only used during spring and fall migrations. Their population trend is unknown. Single young are born from mid June to early July in large nursery colonies. They can fly in about 5 weeks. Moths are the preferred food.																				

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Brazilian free-tailed bat *Tadarida brasiliensis*		Indigenous							S	S	S	S	S	S	C					H
	r	Wasatch Plateau	These nongame bats inhabit desert and submontane regions. Caves and cliff crevices serve as diurnal roosts. This species may not be a year-long resident. Their population trend is unknown. Females form nursery colonies, but this species is otherwise not colonial. Single young are born annually in late June and July. They emerge in late August. These bats feed nocturnally on large moths.																	
	r	Tavaputs Plateau																		
	r	Cedar Mountain																		
	r	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	r	San Rafael Desert																		
	r	Burr Desert																		
	r	Cisco Desert																		
	r	Canyonlands																		
Family: Canidae		Indigenous	L	S	S	S	S	S	S	S	H	S	S	S		S	L	H		
*coyote *Canis latrans*	c	Wasatch Plateau	Despite decimating control efforts brought upon by the livestock industry, the coyote population remains stable. This furbearer occurs at all elevations. Den sites vary greatly. Breeding occurs from January-March. After a 63 day gestation period, an average of 6 young are born in April and May. Eyes open after 9 to 14 days. They are weaned after 6 weeks and disperse from the den after 6-9 months. Coyotes are opportunistic feeders but show a preference for rabbits and hares.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*gray wolf Canis lupus		Indigenous	S	S	S	S	S	S	S					H		S	S	H		
	*k	Wasatch Plateau																		
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	*k	Dolores Triangle																		
	*k	San Rafael Desert																		
	*k	Burr Desert																		
	k	Cisco Desert																		
	*k	Canyonlands																		
*gray fox Urocyon cinereoargenteus		Indigenous	L	S	S	S	H	S		S			H	S	H					
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*kit fox Vulpes macrotis		Indigenous		S					S			S	S	S		H	S	H		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		
			Although the population trend of this furbearer is unknown, poison campaigns have decimated many populations. Kits prefer open, level, sandy ground at desert elevations. Four to 7 young are born underground from February to April after a 49-56 day gestation period. Their home range exists up to 2 miles from the den. The pups leave the den after one month and will begin hunting with the adults after three or four months. Most will leave the den in October.																	
*red fox Vulpes vulpes		Indigenous	L	H		L	S	S	H	H	H	S	S	S		H	H	H		
	u	Wasatch Plateau																		
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	u	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	u	Canyonlands																		
			These furbearers occur at all elevations and utilize home ranges of 1-20 square miles. Their population trend is unknown. Abandoned burrows are the preferred nesting sites, but rock crevices, hollow logs, culverts, and openings under buildings are also utilized. Mating occurs from January to early March, gestation requires 51-53 days, and 4 to 8 kits are born between March and May. At one month of age, kits play above ground and eat food brought by the parents. They are independent at 4 months of age.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ursidae *black bear Ursus americanus		Indigenous			H	H	H	L	H	S			S			C	C	C		
	c	Wasatch Plateau	The population trend is increasing for these submontane and montane game animals. Mating occurs from June-July. Females can give birth every other year between January and February to as many as 5 cubs while in their dens. Cubs stay with the female through their second winter. Grasses and forbs are eaten from spring to early summer, when the diet switches to insects and larvae. Carrion is taken when available. Berries and mast are preferred in the fall. These bears prefer forested habitats that contain open meadows.																	
	c	Tavaputs Plateau																		
	o	Cedar Mountain																		
	u	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	u	Dolores Triangle																		
	o	San Rafael Desert																		
	k	Burr Desert																		
	o	Cisco Desert																		
	u	Canyonlands																		
*grizzly bear Ursus arctos		Indigenous			C	C	C	C	H	S	L		S			C	C	C		
	*k	Wasatch Plateau	Grizzly bears were once abundant in remote mountainous regions of southeastern Utah(*). This endangered species has now been extirpated from all wildlands of Utah. The future of these magnificent bears is uncertain.																	
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Procyonidae *ringtail Bassariscus astutus		Indigenous								H	H	H								C
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
			Ringtails inhabit rocky areas of desert and submontane ecosystems. The population trend is stable for these furbearers. Dens are in caves, crevices, hollow trees, rock piles, or unused buildings. One litter per year is born in May or June. The young begin to walk at 35-42 days of age and leave their mother in August or September. Ringtails are carnivorous, nocturnal, and partially colonial. Water must be available within one-half mile of the den site.																	
*raccoon Procyon lotor		Indigenous	H	C					H						H	S	C	C	C	
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
			These omnivorous furbearers occur from desert through submontane elevations. Their population trend is unknown. The male raccoon may travel miles in search of a mate from January to March. Dens are located in hollow trees, logs, rock crevices, or burrows. Clearcutting can seriously reduce the availability of den sites. One to 7 young are born from April to May after a 63 day gestation period. Weaning occurs after 2-4 months and the young will be independent by winter. Adults occupy home ranges of 0.6 to 4 square miles.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Mustelidae *wolverine Gulo gulo		Indigenous			H	C	C	C												H
	*k	Wasatch Plateau																		
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	*k	Canyonlands																		
			The home range of these furbearers has been reported to be anywhere from 80 to 1000 square miles. Wolverines prefer large tracts of montane wilderness. Mating occurs from April-October. There is an actual gestation period of 30-40 days and 1-6 young are born. Up to two litters are raised each year. The young have been observed to remain with the mother for 6 months to 2 years. Dens are preferably located under snow-covered tree roots. They have been extirpated from historic areas(*).																	
*marten Martes americana		Indigenous			C	L	C													C
	*k	Wasatch Plateau																		
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	*k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
			This furbearer prefers late successional montane forests. Home ranges are 1-2 square miles. They eat small animals, honey, pine cone seeds, and berries. Food availability during winter is the most important factor affecting marten survival. Mating occurs in mid summer and implantation is delayed until February or March. Two to five young are born in April after a 4 week gestation period. They remain with the mother for 3 months. Although extirpated, reintroduction sites exist in the region(*).																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*fisher Martes pennanti		Indigenous				C	C	C												
	*k	Wasatch Plateau																		
	*k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	*k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

These furbearers have been extirpated from the Wasatch Plateau due to trapping and disturbance. Potential for reintroduction exists in other areas, also(*). Fishers seem to respond well to protection and habitat restoration. Vast, forest stands with dense canopies provide preferred habitat. Breeding occurs between March and May and an average litter of three young is born between the following February and May. Young will be weaned at two months of age but don't hunt on their own until four months of age. They will disperse at five months of age. Fishers prey on small mammals, birds, and carrion of large mammals.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*ermine Mustela erminea		Indigenous		S		S	S	S		S	S									C
	u	Wasatch Plateau	These furbearers inhabit submontane and montane ecosystems. Males occupy 84 acre home ranges, and females occupy 18 acres. Nests of vegetation mixed with hair are found beneath logs, stumps, roots, brushpiles, or stone walls. A litter of 4 to 8 young are born from April to May after a 9-10 month delayed implantation and 4 week gestation period. By three months of age, the young begin hunting. Availability of small rodents and rabbits seems to be the limiting factor in their distribution. Their population trend is unknown.																	
	u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	u	Abajo/Elk Ridge																		
	u	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	u	Canyonlands																		
*long-tailed weasel Mustela frenata		Indigenous		S		S	S	S		S	S									C
	c	Wasatch Plateau	These furbearers are valuable rodent predators that occur at all elevations. Mating occurs in the summer and 4-9 young are born by the following May. They are weaned after 5-6 weeks and disperse at 2 months of age. Available drinking water is a limiting factor for this species. An area of 4-5 square miles of suitable habitat is required per animal. Long-tailed weasels are preyed upon by hawks, owls, foxes, snakes, and cats.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) acciden[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*black-footed ferret Mustela nigripes		Indigenous		C					C			C		C						
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	e	San Rafael Desert																		
	k	Burr Desert																		
	e	Cisco Desert																		
	e	Canyonlands																		
*mink Mustela vison		Indigenous		L		S	S	S		S	S					C	C	C	C	C
	l	Wasatch Plateau																		
	l	Tavaputs Plateau																		
	k	Cedar Mountain																		
	l	Henry Mountains																		
	l	Abajo/Elk Ridge																		
	l	LaSal Mountains																		
	l	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		

Black-footed ferrets exist at desert or submontane elevations and only where prairie dog colonies are sufficient for prey and den sites. Elimination of these colonies by ranchers, along with predation, disease, and inbreeding have led to the ferret's demise. The breeding season of this animal is generally from March-April. A gestation period of 45 days leads to the birth of 1-5 young. They will remain in the borrow for 45 days. By July they are almost adult size.

These carnivorous furbearers are found near water at submontane and montane elevations. Adjoining forests are utilized for nightly and winter foraging. Along streambanks, males occupy home ranges of 5,100 ft. and females occupy 840 ft. Dens are built along the banks of the wetland system. The breeding season is from February-April. The young are born after a delayed implantation and 45-70 day gestation period. They young will hunt with their mother at 8 weeks of age. In early fall, the litter will disperse. The mink's population trend is unknown.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*badger Taxidea taxus		Indigenous	S	L	S	H	H	H	H	S	H	H	H				S	H		
	c	Wasatch Plateau	These carnivorous furbearers prefer to inhabit open areas of all elevations where there is sufficient soil for burrowing. Prey availability and human disturbance are limiting factors. Mating takes place from August through September. Implantation occurs by February and 2-5 young are born in April. Nursing lasts through June and by late summer the young have dispersed. Male home range sizes are 590 to 1440 acres, while females occupy 390 to 4200 acres.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
*striped skunk Mephitis mephitis		Indigenous	S	H		H	H	H	S	S	S	L	L	S		L	S	C		
	c	Wasatch Plateau	These furbearers prefer forest edges with soils appropriate for burrowing. However, they are adaptable to a variety of habitats at all elevations. Home range sizes can be 30 to 1860 acres, depending on habitat suitability. Breeding occurs from February-May with a brief delayed implantation. Two to eleven young are born from April-June after a 59 to 77 day gestation period. The young will have weaned at 2 months of age. Insects, rodents, birds, and fruit are eaten. Next to man, the great horned owl is the biggest predator of skunks.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*spotted skunk Spilogale putorius		Indigenous	L	S		L	L	L	H	H	H	S	S	S	C	H	S	C		
	c	Wasatch Plateau	Rocky, brushy areas at all elevations are the preferred habitat for these furbearers. They use burrows of other animals for their dens, as well as old logs and brush piles. Mating occurs from September-October and implantation is delayed for 180 to 200 days. After a 50 to 65 day gestation period, 4 young are born sometime from April-July. They will be weaned after 2 months. The bulk of their diet consists of rodents and insects, although fruit is consumed during the fall.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
*river otter Lutra canadensis		Indigenous														C	C	C	C	
	*r	Wasatch Plateau	These carnivorous furbearers inhabit all elevations along streams or lakes with abundant fish life. They use abandoned beaver dens. Trapping, human disturbances, or air and water pollution have reduced their range. Males establish a 40 mile long home range, but may live 2 to 3 miles apart. Otters mate in the spring and 2 to 5 young are born the following March or April. They will be independent at 8 months of age. Potential reintroduction sites exist(*).																	
	*r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	*r	LaSal Mountains																		
	r	Dolores Triangle																		
	*r	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Felidae		Indigenous	L	S	S	H	H	H	L	L	L	C	S		H					
*mountain lion	c	Wasatch Plateau																		
Felis concolor	c	Tavaputs Plateau																		
	u	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	o	Cisco Desert																		
	c	Canyonlands																		
*lynx		Indigenous	L	C	C	C	S	H	H			C			C					
Lynx canadensis	r	Wasatch Plateau																		
	r	Tavaputs Plateau																		
	k	Cedar Mountain																		
	r	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		

Family: Felidae — This game species is found at all elevations. Human encroachment is probably the biggest threat to these secretive animals. Deer are the preferred prey of the lion, and may make up 75% of their winter diet. Dens are generally in rock shelters or caves. Although breeding occurs throughout the year, most young (1-6 per litter) are born from April-September after a 82-96 day gestation period. The young will be weaned at 6 weeks of age, but will remain with their mother for up to 2 years.

*lynx, Lynx canadensis — These solitary furbearers inhabit submontane and montane elevations. Agriculture and clearcutting have reduced the animal's range, although some conversion of mature to secondary growth forests can be beneficial. The 9-10 year population cycle of the lynx can be closely tied to that of the snowshoe hare's. Timber and brush piles are used for den sites. Mating occurs from February-April, producing a litter of 1-4 young after a 63-74 day gestation period. The young can walk at 4 weeks of age, but will remain with the mother for 1 year.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) acciden[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*bobcat Lynx rufus		Indigenous	L	C	H	H	S	C	H	L	L	L	C						C	
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
			This furbearer inhabits all elevations, preferring scrubby areas of broken forests. Primarily, they hunt rabbits, although rodents and birds are also taken. Breeding occurs throughout the spring. One to seven young are born in May or June, following a 60-70 day gestation period. The young are weaned after 8 weeks but stay with the mother into the fall or winter. They will den in logs or rocks, lining the area with dried vegetation. Home range sizes for males are 26 sq. mi. while females occupy 12 sq. mi.																	
Family: Cervidae *moose Alces alces		Indigenous	L	H	C	H	H	H	L						C	H	C			
	u	Wasatch Plateau																		
	u	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
			This game species occurs at submontane and montane elevations. Average home range size is 2300 acres. In some situations, moose show altitudinal migrations and will occupy winter range from 12-1 to 4-15. The population trend of the moose is increasing. The rut occurs in September and October. A 243 day gestation period leads to calving from 5-15 to 7-5. Wetlands, particularly riparian, are critical, year-long. Potential reintroduction sites exist(*).																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*wapiti Cervus elaphus	c c c u c c c o k k l	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	C	H	C	C	C	S	H	H				H		L	C	C		
			Wapiti inhabit all elevations. Forest edges and aspen are critical for calving from 5-15 to 7-5. The rut occurs during September and October, followed by an 8 to 9 month gestation period. Calves will nurse for up to 8 months. Altitudinal migration is displayed by this game animal and they occupy winter range from 12-1 to 4-15. Herbaceous plants are the preferred food, but woody vegetation will supplement the winter diet. Fire can create prime habitat for the elk. The Rocky Mountain subspecies (C.c. Nelsoni) inhabits the region.																	
*mule deer Odocoileus hemionus	c c c c c c c l u l c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	L	S	S	H	C	H	C	C	C	S	S	S		L	H	C		
			These herbivorous, game animals are found at all elevations, but will exhibit seasonal altitudinal migrations. They occupy winter range from 12-1 to 4-15. South facing slopes are critical for winter food availability. The rut occurs during November and December. After a 6-7 month gestation period, the precocial young are born from 5-15 to 7-5. Weaning beings at 5 weeks of age. Continued fire suppression can reduce critical deer habitat.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accide[illegible] (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*pronghorn Antilocapra americana		Indigenous	C						C		L	C	C	C		L	H	C		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	l	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	l	San Rafael Desert																		
	l	Burr Desert																		
	l	Cisco Desert																		
	l	Canyonlands																		
These herbivorous game animals rely primarily on shrubs for their fall and winter diet and forbs during the spring and summer months. They are found at desert and submontane elevations and will exhibit migration in response to severe winter or drought conditions. Fences can create barriers to movement. Critical winter range must be protected from man's disturbance. Breeding occurs from September-October and there is a 230-250 day gestation period. Fawning occurs from 5-15 to 6-15. Water (ph<9.5) is critical throughout the year.																				
Family: Bovidae *bison Bison bison		Indigenous	L		S	C	S	H	S	C	L	L	C				S	S		
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	l	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	u	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
The only free roaming, hunted herd in the lower 48 states inhabits southeastern Utah. They utilize all elevations. Bison migrate altitudinally in response to seasonal changes and will inhabit critical winter range from 12-1 to 4-15. Also of critical value are yearlong ranges. These can be large pinyon-juniper chainings which have been revegetated to promote grasses and forbs. Bison breed from July through September and give birth between 5-1 to 6-10, after a 285 day gestation period.																				

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*mountain goat *Oreamnos americanus*		Indigenous	C	L	L	L	H	H							C	C				
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	*k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

These game animals have been introduced to various areas in Utah. Future transplant activities may bring them to the LaSal mountains(*). They utilize steep, rocky slopes of submontane and montane elevations. Forage consists primarily of grasses or browse. Mosses or lichens are also consumed. Breeding occurs from October-January. There is a 147-178 day gestation period. One kid or twins are born in May or June. Road construction in Idaho and Montana has been shown to cause disturbance to populations.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
				Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
*bighorn sheep		Indigenous				H				C	H	H	C	C	H	C	L	H	C		
Ovis canadensis	k		Wasatch Plateau																		
	*l		Tavaputs Plateau																		
	o		Cedar Mountain																		
	*l		Henry Mountains																		
	*o		Abajo/Elk Ridge																		
	*k		LaSal Mountains																		
	l		Dolores Triangle																		
	c		San Rafael Desert																		
	u		Burr Desert																		
	k		Cisco Desert																		
	*c		Canyonlands																		
				Bighorns inhabit precipitous areas of all elevations. Winter range is occupied from 12-1 to 4-15. Breeding occurs from November-January. Desert bighorn parturition occurs from 4-1 to 5-31 and rocky mountain bighorns give birth from 5-1 to 6-15. Weaning in these game animals occurs after 6 months. Bighorns are sensitive to disturbance. Water is critical for herd survival. Desert bighorn (O.c. nelsoni) and mountain bighorn (O.c. canadensis) inhabit southeastern Utah. Potential reintroduction sites exist(*).																	
Family: Sciuridae		Indigenous								H		H	H	H	H					H	
white-tailed antelope squirrel	c		Wasatch Plateau																		
Ammospermophilus Leucurus	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	c		Cisco Desert																		
	c		Canyonlands																		
				Whitetailed antelope squirrels are found at desert and submontane elevations, preferring rocky or gravelly soil. Their population trend is stable. They burrow beneath shrubs, trees, or rocks. Five to 14 young are born in early spring and occasionally a second litter occurs. These solitary mammals are active all year, although some may hibernate. They forage on the ground and sometimes in cacti for seeds and fruit. The home range size of these nongame animals is 14-20 acres.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Gunnison's prairie dog Cynomys gunnisoni		Indigenous		H					H			H		H						
	k	Wasatch Plateau	Gunnison's (Zuni) prairie dogs can occur at all elevations. They occupy a 2 acre home range size. Breeding occurs in March and April. Young are born in early May after a 30 day gestation period and are above ground at 4 weeks of age. This species hibernates from October through March in high mountain valleys. Prairie dogs eat grasses, forbs, roots, and seeds during hibernation. Attempted eradication by man and outbreaks of plague have impacted populations. The population trend of these nongame animals is presently stable.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
white-tailed prairie dog Cynomys leucurus		Indigenous		H					H			H		H						
	l	Wasatch Plateau	These nongame animals inhabit 2-3 acre home ranges at all elevations where there is well-drained soil for burrowing. Breeding occurs in March. An average of 5 young are born in May or June after a 30 day gestation period. They will be above ground after 4 weeks. Hibernation occurs from October-March. Preferred foods are grasses and forbs, but underground roots and seeds are probably eaten during hibernation. In some areas, this species relies heavily on saltbush. Their population trend is stable.																	
	k	Tavaputs Plateau																		
	l	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	c	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
northern flying squirrel Glaucomys sabrinus		Indigenous				C														C
	c*	Wasatch Plateau	These nongame animals occur at montane elevations. Their population trend is unknown. Nests are built of shredded bark in tree hollows and woodpecker holes. Mating occurs in the winter, and a litter of 2 to 5 young are born around May and June after a 37-42 day gestation period. Sometimes there is a second litter in late summer. Young emerge from the nest after 40 days and are weaned at 2 months of age. They eat various nuts and seeds and occasionally insects.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
yellow-bellied marmot Marmota flaviventris		Indigenous			S	S	S	S	S	S	S			C	C			S		
	c	Wasatch Plateau	These nongame animals prefer rocky areas of submontane and montane elevations. Their population trend is stable. Dens are in hillsides, crevices, or under rockpiles near large boulders and herbaceous plants. A litter of 3 to 5 young is born in June after a 30 day gestation period. Weaning and emergence from the burrow occur about a month later. Hibernation occurs from late August to late February or March. Stored fat sustains them through winter. Applications of herbicides can be harmful.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
				Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Abert's squirrel Sciurus aberti		Indigenous							C												
	k		Wasatch Plateau	This nongame species is limited to mature, closed canopy ponderosa pine forests. Forest practices that reduce the canopy to less than 60% are detrimental. Mating occurs from March-April. Bulky nests are built in the pines and require a minimum 50 ft. undisturbed radius. Three to four young are born between April and May after a 40-46 day gestation period. The young are independent by June. Pine cambiums and seeds along with pinyon nuts are preferred by Abert's squirrels. The population trend for this montane species is unknown.																
	k		Tavaputs Plateau																		
	k		Cedar Mountain																		
	k		Henry Mountains																		
	r		Abajo/Elk Ridge																		
	r		LaSal Mountains																		
	k		Dolores Triangle																		
	k		San Rafael Desert																		
	k		Burr Desert																		
	k		Cisco Desert																		
	k		Canyonlands																		
Uintah ground squirrel Spermophilus armatus		Indigenous							C										H		
	c		Wasatch Plateau	Uintah ground squirrels prefer open, well-drained, grassy meadows at submontane and montane elevations. The population trend is stable for these nongame mammals. A litter of 4 to 6 young is born in April or May, after a 26 day gestation period. The young emerge from their burrows in 24 days. Hibernation lasts from September-April and estivation occupies the summer months. These colonial squirrels feed mainly on green vegetation.																
	c		Tavaputs Plateau																		
	k		Cedar Mountain																		
	k		Henry Mountains																		
	k		Abajo/Elk Ridge																		
	k		LaSal Mountains																		
	k		Dolores Triangle																		
	k		San Rafael Desert																		
	k		Burr Desert																		
	k		Cisco Desert																		
	k		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
golden-mantled ground squirrel *Spermophilus lateralis*		Indigenous			S	S	S	S	S	S	S				H				S	
	c	Wasatch Plateau	These nongame animals are found at submontane and montane elevations. Their population trend is stable. Rock outcrops or talus slopes are preferred for cover. Nests are shallow burrows under or near logs, tree roots, or boulders. Two to eight young are born in April or May after a 27 day gestation period. They are weaned to independence at 35-48 days of age. Hibernation lasts from October to May, depending on altitude. Stored food and a layer of fat help maintain them though winter. Seeds, nuts, and fruit are staples.																	
	c	Tavaputs Plateau																		
	u	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	u	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
*Richardson's ground squirrel *Spermophilus richardsonii*		Indigenous			C				C											
	k	Wasatch Plateau	These nongame mammals occur at submontane and montane elevations. Their population trend is unknown. They are usually solitary but appear colonial in favorable habitats. Burrows are in gravelly soil and may have several openings. Seven to eight young are born in May and are foraging with the mother by June. Hibernation lasts from September through January or March. Seeds stored in cheek pouches are eaten after hibernation along with insects, stems, and leaves.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*spotted ground squirrel <u>Spermophilus spilosoma</u>		Indigenous		H		S	S	S	H	H	H									H
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
			Spotted ground squirrels prefer submontane and montane regions with sandy soils and sparse, low growing vegetation. In areas overgrazed by domestic livestock, they have become numerous. Probably 2 litters of 5 to 7 young are born in underground burrows by late April. The young disperse at 6 weeks of age. These, shy, secretive squirrels are active all year, although some hibernate from August to March. the population trend of these nongame animals is unknown. Their home range size averages 3 to 4 acres.																	
*thirteen-lined ground squirrel <u>Spermophilus tridecemlineatus</u>		Indigenous							S			S		C						
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	r	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	r	San Rafael Desert																		
	r	Burr Desert																		
	r	Cisco Desert																		
	r	Canyonlands																		
			These nongame animals occur at desert and submontane elevations. Their population trend is unknown. Mating occurs in April. In May, after a 28 day gestation period, 8 to 10 young are born in concealed burrows. Young are weaned in 4 weeks but may remain at the burrow for a few more weeks. They hibernate from October to March or early April. These squirrels are solitary and strictly diurnal.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
rock squirrel Spermophilus variegatus		Indigenous			S					H	H				H				H	
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
			Rock squirrels are found in rocky areas at desert and submontane elevations. Their population trend is stable. Dens are burrows beneath boulders or in hollow trees. Two litters of 5 to 7 young are born between May and July after a 30 day gestation period. They emerge from the burrow after 8 weeks and disperse in another month. Rock squirrels are generally crepuscular. Some may hibernate for short periods. They climb trees in search of nuts, seeds, fruits, eggs, and insects.																	
cliff chipmunk Tamias dorsalis		Indigenous						H		H	H			C					H	
	u	Wasatch Plateau																		
	u	Tavaputs Plateau																		
	u	Cedar Mountain																		
	u	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	u	San Rafael Desert																		
	u	Burr Desert																		
	u	Cisco Desert																		
	k	Canyonlands																		
			These nongame chipmunks are cliff dwellers that inhabit all elevations. Their population trend is stable. They are in a state of torpor during winter but may emerge during warm spells. Nuts, seeds, and fruit are the major food items. Breeding occurs from March-May. A gestation period of 28-31 days leads to the birth of 4-6 young. They begin to disperse at 4 weeks of age. Chaining and road construction activities have been shown to adversely affect populations.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	wetlands: Marsh	Mesic Meadow	Riparian	Stream	Lake
				Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)																	
least chipmunk *Tamias minimus*		Indigenous				H	H	H	H	C	S	S	C			C					
	c		Wasatch Plateau																		
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	c		Cisco Desert																		
	c		Canyonlands																		
Colorado chipmunk *Tamias quadrivittatus*		Indigenous				H		H	H		H					S				H	
	k		Wasatch Plateau																		
	c		Tavaputs Plateau																		
	k		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	k		San Rafael Desert																		
	c		Burr Desert																		
	k		Cisco Desert																		
	c		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

These nongame animals inhabits all elevations and occupy home ranges of 2-4 acres. Their population trend is stable. They ascend trees readily and may even nest in them. Nests are burrows beneath stumps, logs, or rocks. A litter of 5 to 7 young is born in May after a 28-30 day gestation period. The young are independent after 2 months. This species gathers and stores seeds, nuts, fruit, and insects during the spring, summer, and fall. It hibernates in the winter and readily adapts to human activity at campgrounds.

Colorado chipmunks prefer rocky slopes and ridges at submontane and montane elevations. A shrub understory is preferred so that den sites can be constructed under the shrubs or rocks. The young are born in August after a 30-33 day gestation period. They will be weaned in 6-8 weeks. The chipmunks will forage on nuts, berries, bird eggs, and carrion. Adults occupy home ranges averaging 1-3 acres in size. Their population trend is stable.

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
				Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Uintah chipmunk Tamias umbrinus		Indigenous					H		H		H	H				H			H		
	c		Wasatch Plateau																		
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	k		Cisco Desert																		
	c		Canyonlands																		
red squirrel Tamiasciurus hudsonicus		Indigenous					C		H										H	C	
	c		Wasatch Plateau																		
	c		Tavaputs Plateau																		
	k		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	k		San Rafael Desert																		
	k		Burr Desert																		
	k		Cisco Desert																		
	c		Canyonlands																		

Uintah chipmunks prefer talus slopes at submontane and montane elevations. The population trend of these nongame animals is stable. Young are born in early summer and weaned by mid July depending on the elevation. These squirrels are sustained through their winter hibernation with a layer of fat. Their diet includes nuts, seeds, and fruit. They readily adapt to human presence at campgrounds.

These omnivorous, nongame animals are indigenous to dense stands of the montane coniferous forests. The breeding season occurs from February-September. Nests are constructed of leaves, twigs, and bark in tree cavities and branches. Three to seven young are born in March or April after a 31-35 day gestation period. Often there is a second litter in August or September. Young are weaned at 10 weeks of age. They are territorial and active all year. Home range size average 4.5 acres. Their population trend is stable.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
				Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Geomyidae Botta's pocket gopher Thomomys battae		Indigenous				S				S					S						
	c		Wasatch Plateau	Botta's pocket gophers occur at all elevations. The population trend of these nongame, herbivorous animals is unknown. They are solitary and spend most of their time underground, except during the mating season. The peak breeding season is from October-June. Five to seven young are born from November-April. They are weaned at 35-40 days of age and disperse by 2 months of age. Home range sizes have been recorded at 1300-2200 square feet.																	
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	c		Cisco Desert																		
	c		Canyonlands																		
northern pocket gopher Thomomys talpoides		Indigenous			H	H	H	S	H	H	S	H			H					H	
	c		Wasatch Plateau	Northern pocket gophers prefer deep, sandy soils at submontane and montane elevations. They often inhabit alfalfa fields that are left unplowed. The population trend of these nongame animals is unknown. They seldom appear above ground and venture no more than 2-1/2 ft. from the burrow entrance when they do. One or two litters per year of 4 to 7 young are born from February-June after an 18-20 day gestation period. They are weaned after 40 days and disperse after another 2 weeks. Pocket gophers usually forage underground for roots, tubers, and stems.																	
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	k		Cisco Desert																		
	c		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accid[illegible]l; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Heteromyidae Ord's kangaroo rat Dipodomys ordii		Indigenous							H	S	H	H	H	H						H
	c	Wasatch Plateau	These nongame animals prefer sandy soils at desert and submontane elevations. Their population trend is unknown. This species is active all year but seldom appear above ground in cold weather. Days are spent in deep burrows in the sand, which they plug to maintain temperature and humidity. January-March and August-October are the breeding seasons. After a 29-30 day gestation period, 2-5 young are born. They are independent after 8 weeks. They eat insects and seeds and will drink water when available.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
plains pocket mouse Perognathus flavescens		Indigenous							H		H	H	H	H						
	c	Wasatch Plateau	Plains pocket mice inhabit sandy soils at desert and submontane elevations. The population trend of these nongame mice is unknown. Burrows are constructed under cacti or low shrubs. The breeding season occurs from April-August with the birth of 2-5 young. Usually two litters are born a year. The mice subsist primarily on seeds.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
silky pocket mouse *Perognathus flavus*		Indigenous							S			S	S	S						
	k	Wasatch Plateau	Silky pocket mice prefer sandy or rocky soils at desert or submontane elevations. The population trend of these nongame animals is unknown. Small burrows are usually no more than 4 inches deep and are typically located under shrubs, with about 3 to 4 openings. Occasionally they use abandoned burrows of other mice. A litter of 2 to 6 young is born from May-July after a 4 week gestation period. Sometimes there are 2 litters a year. Silky mice metabolize water from their diet of seeds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
*rock pocket mouse *Perognathus intermedius*		Indigenous							H			H	H	C				H		
	k	Wasatch Plateau	These nongame mice inhabit rocky slopes and old lava flows at desert elevations. Their population trend is unknown. Three to six young are born from May to July and weaned by mid July. These nocturnal animals spend the daytime in tiny burrows under rocks. They eat various seeds.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Great Basin pocket mouse Perognathus parvus		Indigenous								H			H	H	H					
	c	Wasatch Plateau	These nongame animals are found at desert and submontane elevations. Their population trend is unknown. Nesting and storage burrows are shallow, but a deep (3-6 ft.) tunnel is dug to a hibernaculum lined with dry vegetation. Hibernation lasts from September-April. Mating occurs in April and August. There may be 2 litters per year. These solitary mice eat seeds from which they metabolize water.																	
	k	Tavaputs Plateau																		
	c	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Castoridae *beaver Castor canadensis		Indigenous					C									C	C	C	C	C
	c	Wasatch Plateau	These herbivorous furbearers depend upon permanent water sources within 1/4 mile of woodlands. Most foraging activity occurs within 300 ft. of water. They are found at all elevations and their population trend is increasing. Beaver lodges are usually surrounded by water and are essential for escape, resting, thermal, and reproductive cover. Bank dens are also utilized. Mating occurs from January to late February. One to eight kits are born from April-July after a 107 day gestation period. Weaning occurs after 8 weeks.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Muridae		Indigenous								H	H	H			C					
white-throated woodrat	k	Wasatch Plateau	These herbivorous nongame animals inhabit rocky cliffs and shallow caves of submontane elevations. Their population trend is unknown. Houses are built 2 to 3 ft. high amongst cacti and brush or in cliff caves. Usually home ranges are under 100 ft. across, and population densities are 10 to 20 adults per acre. Breeding occurs from April-September. Probably more than one litter of 1 to 3 young are born after a one month gestation period. Young disperse after 2-3 months.																	
Neotoma albigula	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
bushy-tailed woodrat		Indigenous								H		S	S	S	S			C		
Neotoma cinerea	c	Wasatch Plateau	These herbivorous nongame animals inhabit rocky outcrops of submontane and montane elevations. These "pack rats" utilize just about any loose object in the creation of their nest piles which are located well above ground. One to two litters are born from April-September after a 27-32 day gestation period. Young leave the nest after 2 months. Den sites include rock crevices, mine shafts, and hollow logs. Availability of suitable den sites is a limiting factor to populations.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
desert woodrat Neotoma lepida		Indigenous							S		L	S	S		C					
	c	Wasatch Plateau	Desert woodrats inhabit valley floors or rocky slopes at desert and submontane elevations. The population trend is unknown for these nongame residents. Dens are built of debris and located under rocks, on the ground, along cliffs, and sometimes in trees. Availability of suitable nest sites is a limiting factor. Usually 2 or more litters of 2 to 3 premature young are born after a gestation period of 30-36 days. Their eyes are open at 13 days of age and they are weaned after 4 weeks. They feed mostly on seeds, acorns, cacti, or fruit.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	k	Canyonlands																		
Mexican woodrat Neotoma mexicana		Indigenous				H		H			H	H			C					
	k	Wasatch Plateau	These nongame mammals inhabit rocks and cliffs at all elevations. Their population trend is unknown. Nests are built with vegetation and other debris in rocky crevices, hollow trees, brush piles, or buildings. They eat green plants, berries, nuts, acorns, and fungi. Breeding occurs from March through May with two litters of 2-4 young being born. Gestation lasts for 31-34 days.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Stephen's woodrat *Neotoma stephensi*		Indigenous									C				C					
	k	Wasatch Plateau	These nongame woodrats are dependent upon rocky areas of submontane elevations. Their population trend is unknown. Nests are usually constructed of pinyon-juniper branches. One young is born between March and May, and females will normally only produce one litter during their life. Growth is slow and the young are normally weaned later than other woodrats of comparable size. Their diet consists primarily of juniper leaves. The species is known to occur only in the Navajo Mountain region.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
northern grasshopper mouse *Onychomys leucogaster*		Indigenous							S			S	S	S	S				S	
	k	Wasatch Plateau	Northern grasshopper mice are found in sandy or silty areas at desert and submontane elevations. Abandoned burrows are often utilized, or they construct their own at the base of shrubs. They maintain a complex system of burrows in open areas. Grasshoppers, insects, mice, and vegetation are stored in the cache burrows. Three to four young are born between June and August after a 4 week gestation period. They are weaned after 3 weeks. Adults occupy 6 acre home range sizes. The population trend of this nongame animal is unknown.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	l	Abajo/Elk Ridge																		
	l	LaSal Mountains																		
	l	Dolores Triangle																		
	l	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	l	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
brush mouse Peromyscus boylii		Indigenous							S	H	H		S		S					H
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
		Canyonlands																		
canyon mouse Peromyscus crinitus		Indigenous							S	C	C				C					C
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

This nongame species prefers rocky sites at desert and submontane elevations. They occupy home ranges of .08 to .23 acres. Their population trend is unknown. Nests are usually built under rocks, in crevices or on brush piles. Breeding probably occurs year-round. A litter of 2 to 6 young is produced 4 or more times a year after a 22-25 day gestation period. Their diet includes pine nuts, acorns, seeds, and berries.

Canyon mice are restricted to rocky areas of submontane elevations. The population trend is unknown for this secretive, nongame species which lives among and burrows beneath barren rocks and crevices lining canyon walls. Usually, 2 to 5 young are born from March-July and weaned after 24-28 days. Two litters are born each year. They feed on seeds, insects, leaves, flowers, and fungi. Adults occupy 0.8 to 1.0 acre home ranges.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*rock mouse *Peromyscus difficilis*		Indigenous		S						S	H		S	S	S	C				S
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	r	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	r	Cisco Desert																		
	r	Canyonlands																		
deer mouse *Peromyscus maniculatus*		Indigenous		S	S	S	S	S	S	S	S	S	S	S	S					S
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

Rock mice are found in brushy, rocky areas of outcrops, cliffs, and canyon walls at desert and submontane elevations. The population trend of this nongame species is unknown. Usually 3 to 4 young are born between April and October after a 3-4 week gestation period. Diet consists mainly of pinyon-juniper nuts and fruit, but insects are fed upon heavily in the summer.

These nongame mammals prefer dryland habitats at all elevations. Their population trend is unknown. They dig small burrows in the ground although the woodland subspecies usually nests in hollow logs. Deer mice store seeds, nuts, fruit, insects, and fungi in hollow logs or other protected areas. The peak breeding season lasts from April-September. A gestation period of 23-28 days leads to the birth of 1-9 young. Up to 4 litters a year are produced. Adults occupy 0.5 to 5 acre home ranges.

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
pinyon mouse Peromyscus truei	c c c c c c c c c k c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	These herbivorous, nongame mammals occur at submontane elevations featuring rocky terrain and shrubby understories. Their population trend is unknown. Grasses, leaves, and shredded juniper bark are used for construction of nests in hollow juniper trunks or under rocks. Small secondary nests of juniper bark scattered about their 0.5 square mile home range may be present. Breeding occurs from April-September with the birth of 3 to 6 young. Their eyes and ears open after 16-21 days.							H	C								S	
western harvest mouse Reithrodontomys megalotis	c c c c c c c c c c c	Indigenous Wasatch Plateau Tavaputs Plateau Cedar Mountain Henry Mountains Abajo/Elk Ridge LaSal Mountains Dolores Triangle San Rafael Desert Burr Desert Cisco Desert Canyonlands	These nongame mice prefer dense vegetation near water at desert and submontane elevations. They will inhabit disturbed areas. Their population trend is unknown. Breeding occurs throughout the year. Gestation lasts 23 to 24 days and 2-4 young are born. Weaning occurs after 24 days. Nests are usually located in vines, tall vegetation, woodpecker holes, fence posts, or small trees. Although mainly seed eaters, they also feed on new growth in the spring and insects in the summer.	S			S	S	S	S	S	C		H	H	C				

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
sagebrush vole Lagurus curtatus		Indigenous							C	S								H		
	k*	Wasatch Plateau	Sagebrush voles inhabit areas of loose soil at submontane elevations. The population trend is unknown for this nongame species. Shallow burrows lined with shredded sagebrush bark and grass are constructed near sagebrush. Breeding occurs all year, producing up to 3 litters of 4 to 6 young after 25 day gestation periods. The young are weaned after 3 weeks. The voles feed on grass heads and other green plants in the summer, and bark and twigs of sage and various roots in the winter.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		
long-tailed vole Microtus longicaudus		Indigenous				S	S	S	S				S					H		
	c	Wasatch Plateau	These nongame voles inhabit submontane and montane ecological associations. Their population trend is unknown. Nests are located aboveground in the winter and below in the summer. A litter of 4 to 8 young is born between May and October, although the peak breeding season occurs in June and July. The young are mature by 3 weeks of age. Diet includes grasses, bulbs, and bark of small twigs.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*Mexican vole Microtus mexicanus		Indigenous			H			C	H					H				S	S	
	k	Wasatch Plateau																		
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	r	Abajo/Elk Ridge																		
	r	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	r	Canyonlands																		
			Mexican voles are found in arid conditions of submontane and montane elevations. They prefer grassy meadows within ponderosa pine habitat. The population trend is unknown for these nongame animals. Their grass nests may be located in clumps of vegetation, under logs, or in underground burrows. The breeding season lasts from May-October and a litter of 3 to 4 young is born. There is a 20-23 day gestation period. Young are weaned after another 2-3 weeks. They probably feed on grass, roots, bark, and seeds.																	
montane vole Microtus montanus		Indigenous						C						C		L	C	H		
	c	Wasatch Plateau																		
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
			This nongame species occurs at submontane and montane elevations. The population trend is unknown. These voles live in runway and burrow systems under grassy cover. This grass, including sedges and rushes, is the staple of their diet throughout the year, although leafy plants are a preference during the summer. Depending on food availability, populations fluctuate from year to year. They have one litter averaging 5 young from March-November. Young are independent after 2-3 weeks.																	

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
meadow vole Microtus pennsylvanicus		Indigenous							S					C		H	C	H		
	c	Wasatch Plateau	These herbivorous, nongame animals inhabit all elevations. Their population trend is unknown. Populations may fluctuate at 3 to 4 year intervals. During the summer, meadow voles may nest in burrows or in depressions under matted vegetation. In the winter, they will nest on the surface as long as snow provides protection and insulation. Breeding occurs throughout the year. Several litters of 4 to 6 young are born after a 21 day gestation period. They are weaned after 12-14 days. Adults occupy 0.1 to 1 acre home ranges.																	
	k	Tavaputs Plateau																		
	c	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
water vole Microtus richardsoni		Indigenous			H											C	C	C		
	c	Wasatch Plateau	Water voles are found in submontane and montane regions. The population trend is unknown for this nongame species. Colonial burrows are constructed along fast moving clear streams. In winter, they move further from water and build grass nests in their runways under the snow. The breeding season occurs from May to August. Litters of 2-10 young appear by July after a 3 week gestation period. They are sexually mature at 2 months of age. Their diet consists of leafy plants.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*muskrat Ondatra zibethicus		Indigenous														C	C	C	C	C
	c	Wasatch Plateau	The population trend of these omnivorous furbearers is stable. They inhabit regions of desert and submontane elevations that contain relatively still bodies of water with dense surrounding vegetation. The breeding season is from April-August. Two to 3 litters per year are born after a 22 to 30 day gestation period. Young are weaned at 4 weeks of age. Populations tend to follow a 10 year cycle. Muskrats may construct conical lodges of marsh vegetation, or dig burrows into banks. Adults occupy home ranges averaging 183 ft. in diameter.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
house mouse Mus musculus		Exotic	C	H																
	c	Wasatch Plateau	This nongame species is associated with buildings and weedy fields of all elevations. Their population trend is unknown. They make their own nests but are colonial. Breeding occurs all year. Gestation lasts 18 to 21 days, and several litters are produced. Young disperse after 3 weeks. If local populations become too dense, many females become infertile. Albinos of this species are used in research.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Norway rat Rattus norvegicus		Exotic	C	H																
	c	Wasatch Plateau	These nongame animals occur at all elevations and burrow along building foundations. Their population trend is unknown. Breeding occurs all year, gestation is 21 to 22 days, and 12 litters of 2 to 22 young are possible. Young are dependent by 3 weeks of age. Mass migrations may occur if local populations become severely overcrowded. They are colonial with home ranges of less than 100 ft. diameter. Norway rats are omnivorous and can contaminate grain with their droppings. They have also been known to kill chickens and eat their eggs.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
black rat Rattus rattus		Exotic	C	H																
	c	Wasatch Plateau	These nongame animals are found at any elevation, living in buildings or fields. Their population trend is unknown. Nests are located in tangled vines and trees. Breeding occurs year round, producing litters of 2 to 8 young. Black rats are omnivorous but partial to grain. They can contaminate grain with their droppings and carry diseases such as bubonic plague.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Dipodidae western jumping mouse Zapus princeps		Indigenous							S	S		S		H			C	C		
	c	Wasatch Plateau	These nocturnal, herbivorous, nongame mice are found at desert and submontane elevations. They live in burrows within 150 feet of water. Breeding occurs soon after emergence from hibernation. Nests are depressions in grass or moss. A single litter of 4-8 young is born in June or July after an 18 day gestation period. The young nurse for one month and are fully independent after 2-3 months. Male home range sizes have been reported as 691 x 100 ft. and females occupy 510 x 100 ft. home ranges.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	l	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Erethizontidae porcupine Erethizon dorsatum		Indigenous			H	H	H	H	H	H										H
	c	Wasatch Plateau	These nongame animals occur at all elevations. Their population trend is stable. Hollow trees or natural caves serve as den sites. Breeding occurs in October and November. Gestation lasts 7 months and a single young is born in May or June. The young nurses for 2-3 weeks and will disperse after 3-4 months. In the spring adults feed on twigs and herbaceous vegetation. In the winter they feed on cambium. Although active year round, they may den up in holes in the bitter cold. Their average yearly home range size is reported as 173 acres.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	k	Cisco Desert																		
	c	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
Family: Ochotonidae pika Ochontona princeps		Indigenous			C					H				H	C			H		
	l	Wasatch Plateau	Pikas inhabit talus slopes and rockslides at montane elevations. They can't tolerate air temperatures above 82°F. Their population trend is unknown. These nongame animals are colonial and territorial. Breeding occurs in the spring and early summer. Two to three litters of 1-5 young are born between April and August. They are weaned at 3-4 weeks of age. Pikas do not hibernate. These diurnal animals eat grasses and herbs, storing them in small "haystacks" beneath boulders.																	
	k	Tavaputs Plateau																		
	k	Cedar Mountain																		
	l	Henry Mountains																		
	l	Abajo/Elk Ridge																		
	l	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		
Family: Leporidae *snowshoe hare Lepus americanus		Indigenous			C	H	H	H		S										C
	c	Wasatch Plateau	These game animals inhabit submontane and montane areas. Snowshoe populations are cyclic every 9 to 10 years. Their nests are shallow depressions in dead leaves under trees or shrubs. Usually 2-3 litters of 3 young are born from April to August after a 36 day gestation period. They become independent in about 2 weeks. Snowshoes feed upon grasses, forbs, and berries in the summer and conifer buds, aspen, and willow bark in the winter. Home range sizes can reach 20-25 acres, depending on available cover.																	
	c	Tavaputs Plateau																		
	k	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	k	San Rafael Desert																		
	k	Burr Desert																		
	k	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic: Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
			Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
black-tailed jack rabbit Lepus californicus		Indigenous	H						C	S	S	S	S	S						
	c	Wasatch Plateau	These nongame animals are found at desert and submontane elevations. Their population trend is stable. Breeding can occur year-round. One to 4 litters per year are born in deep depressions lined with hair. There is a 41-47 day gestation period. The 1 to 8 young are weaned in 2-3 weeks and dispersed at 4 weeks of age. Jack rabbits occupy home range sizes of 49-74 acres. They also concentrate in winter feeding areas. They feed on lush vegetation in the summer and woody and dried vegetation in the winter.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	c	Henry Mountains																		
	c	Abajo/Elk Ridge																		
	c	LaSal Mountains																		
	c	Dolores Triangle																		
	c	San Rafael Desert																		
	c	Burr Desert																		
	c	Cisco Desert																		
	c	Canyonlands																		
white-tailed jack rabbit Lepus townsendii		Indigenous	H						C	S	S	S	S	S						
	c	Wasatch Plateau	The population trend is stable for these nongame animals of desert and submontane elevations. Breeding occurs from late April-early May. Four young are born, concealed in vegetation, after a 30-43 day gestation period. They can forage for themselves in 15 days and will disperse after another 3-4 weeks. They feed mostly on green vegetation in the summer and buds, bark, and twigs in the winter. Competition with the black-tailed species and habitat loss threatens populations. Home range size averages 173 acres.																	
	c	Tavaputs Plateau																		
	c	Cedar Mountain																		
	k	Henry Mountains																		
	k	Abajo/Elk Ridge																		
	k	LaSal Mountains																		
	k	Dolores Triangle																		
	c	San Rafael Desert																		
	k	Burr Desert																		
	c	Cisco Desert																		
	k	Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

Mammalian Species (*) high-interest because of economic, aesthetic, educational, scientific, or ecological value	Relative Abundance[1]	indigenous/exotic	Distribution by Geographic Area	Relative Biological Value of Ecosystems: critical (C), high-priority (H), substantial (S), limited (L)													wetlands				
				Urban	Agricultural	Alpine	Spruce/Fir	Aspen	Ponderosa	Sagebrush/grass	Mountain brush	Pinyon/juniper	Saltbush/grass	Blackbrush	Grassland	Barren	Marsh	Mesic Meadow	Riparian	Stream	Lake
*desert cottontail Sylvilagus audubonii		Indigenous		C						C	S	S	S	S	H	H					H
	c		Wasatch Plateau	These game animals occur at desert and submontane elevations. Their population trend is stable. Breeding occurs year-round. At least two litters of 1 to 6 young are born from April through July after a 25-35 day gestation period. Nests are fur-lined depressions or abandoned burrows of badgers, prairie dogs, or pocket gophers. Young begin to venture from the nest at 2 weeks of age and are weaned at 3-4 weeks of age. They eat herbaceous vegetation, mesquite, bark, twigs, and cacti. Adults occupy home ranges of 2-15 acres.																	
	c		Tavaputs Plateau																		
	c		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	c		Dolores Triangle																		
	c		San Rafael Desert																		
	c		Burr Desert																		
	c		Cisco Desert																		
	c		Canyonlands																		
*Nuttall's cottontail Sylvilagus nuttallii		Indigenous		C		S	S	S	C	H	S			H	H						H
	c		Wasatch Plateau	These game animals inhabit submontane and montane elevations. They prefer thickets, loose rocks, and cliffs. Their population trend is stable. Breeding occurs from February through July. Their nests are shallow depressions lined with fur. Litters of 3 to 8 young are born 2 to 5 times a year, usually between April and July. There is a 28-30 day gestation period. They are weaned at about one month of age. This rabbit prefers grasses and forbs but also consumes sagebrush most of the year.																	
	c		Tavaputs Plateau																		
	k		Cedar Mountain																		
	c		Henry Mountains																		
	c		Abajo/Elk Ridge																		
	c		LaSal Mountains																		
	k		Dolores Triangle																		
	k		San Rafael Desert																		
	k		Burr Desert																		
	k		Cisco Desert																		
	c		Canyonlands																		

1. Relative Abundance: (c) common; (u) uncommon; (l) limited; (r) rare; (e) endangered; (t) threatened; (o) occasional; (a) accidental; (k) unknown to inhabit area

CONCLUSION

At the time of settlement for Utah (1847) 450 vertebrate species inhabited the southeastern region. Today (1990) there are 481 species present: 42 piscinian (fish); 13 amphibian, 36 reptilian, 285 avian (birds), and 105 mammalian. The increase in total vertebrate species numbers is attributed to the introduction of 39 exotics that were not present at the time of settlement. Seven native species, three of which are endangered in other areas where they still survive, have been extirpated. Another, the passenger pigeon, is extinct. In addition, eight native species that remain inhabitants of the region are considered to be endangered with extinction. Yet another native species is classified as threatened and 46 are classed as rare.

The implications of these losses are tremendous. While the natural world is by no means stable, and species have evolved and become extinct throughout time, current losses have occurred primarily due to man's impact on the environment. Loss of habitat, environmental pollutants, and disturbances during crucial time periods take their toll on wildlife populations. Continuing encroachment of human settlement into wildlife use areas is likely to cause increased stress and pressures on wildlife.

This publication has focused on critical habitats ; crucial time periods, and life requisite requirements for each of the species inhabiting southeastern Utah. Final analysis (Table 6) of wildlife distribution throughout the region recounts patterns of habitat utilization. Although not numerically assessed, experience has shown ecotone areas to support the greatest variety and numbers of wildlife.

Table 6. Numbers of vertebrate wildlife species per class of wildlife and the proportion (%) of that total which now (1990) inhabit each ecosystem by ecological association within southeastern Utah.

Class of Wildlife Number of Species	Proportion (%) of species that inhabit each ecosystem by (1) Cold Desert (3,700–5,800 ft.); (2) Submontane (5,500–8,500 ft.); and (3) Montane (6,500–12,721 ft.) ecological associations.																																															
	UPLANDS																																							**WETLANDS**								
	URBAN			AGRICULTURAL			ALPINE			SPRUCE/FIR			ASPEN			PONDEROSA			SAGEBRUSH/GRASS			MOUNTAIN BRUSH			PINYON/JUNIPER			SALTBUSH/GRASS			BLACKBRUSH			GRASSLAND			BARREN			MARSH			MESIC MEADOW			RIPARIAN			STREAM			LAKE		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Piscinian (fish) 42																																																90	76	43	74	24	24
Amphibian 13	8	8	8	85	92				8			8			8			8	31	31	8		15			15		38			31	39		46	46	15	0	0	0	69	92	54	69	92	54	69	92	54	69	92	54	69	92	54
Reptilian 36	11	11	14	47	47				0			31			36			44	78	86	42		78			78		81			75	73		81	78	36	64	58	25	8	6	8	14	17	17	64	72	50	6	6	6	6	6	6
Avian (bird) 285	29	31	21	43	40				8			29			28			31	26	29	17		36			37		19			17	14		23	21	13	10	10	6	45	42	30	26	27	23	74	81	60	29	27	22	30	28	23
Mammalian 105	16	17	12	23	28				23			23			39			44	53	67	40		59			64		44			43	38		44	49	29	21	35	24	19	24	20	15	23	20	49	73	49	4	4	4	4	4	3
Total Species 481	22	23	17	36	36				10			29			28			31	33	39	22		40			42		28			26	23		30	30	17	15	18	11	33	33	24	22	25	21	61	72	52	20	19	16	21	22	16

A majority of piscinian (fish) species inhabit streams (43 to 90%) as compared to lakes (24 to 74%). Lower elevation stream reaches are utilized by the greater percentage of fish species (90% of the fish inhabit desert streams and 76% inhabit submontane streams, whereas only 46% utilize stream reaches of montane elevations). The great diversity of fish species at lower elevations is due to the more expansive water acreages at lower elevations that tend to supply a greater diversity in fish habitat. In addition, cold water fish of montane elevations are apt to descend and survive in waters of lower elevations more readily than warm water species will ascend and adjust to colder temperatures. Within inhabited water bodies, water quality parameters such as temperature, dissolved oxygen concentrations, total dissolved solid concentrations, turbidity, and "pH" determine the species present and vigor of populations.

Between 69% and 92% of all amphibians occur in wetland ecosystems. The submontane elevations support the greatest proportion (92%) of species due to relatively favorable environmental conditions. The scaleless, permeable amphibian skin requires constant moisture to retain body fluids. Both water quantities and water quality parameters are of importance to the survival of individual amphibians and ultimately populations of the species. If negative impacts to water sources occur, local amphibian populations are incapable of moving great distances to new locales.

Reptiles are not nearly as dependent on wetlands since their scaly skin covering provides resistance to desiccation. However, riparian areas are heavily utilized (50 to 72% of all species) for the available drinking water, prey, and vegetative resource (cover). The moist soil characteristic of riparian zones also provides preferred nesting habitat for many reptiles. Desert and submontane riparian areas are utilized most heavily by reptiles.

Submontane pinyon-juniper and mountain brush ecosystems each support 78% of the reptile species. At desert elevations, saltbush-grass accounts for 81% of reptile species and blackbrush communities support 75% of reptile species. Grassland and sagebrush-grass ecosystems also support near or above 80% of all reptilian species at the

submontane of lower elevations. Barren ecosystems (talus slopes, rocky terrain, or bare soil) are utilized as basking areas to provide temperature regulation. They support 58% and 64% of reptile species at desert and submontane elevations, respectively.

The greatest proportion (60 to 81%) of bird species inhabit riparian areas. Riparian corridors are utilized during breeding, foraging, and migrating activities. Submontane elevations show the greatest use (81%) due in part to species movement through the zone when accessing between desert and montane elevations.

Submontane riparian ecosystems are also utilized by the greatest percentage (73%) of mammal species. Water, cover, and forage are excellent in these areas. The abundant food supplies of pinyon-juniper, mountain brush, and sagebrush-grass ecosystems also attract numerous species.

Overall, submontane riparian zones were shown to support 72% of all terrestrial species. Both desert and submontane elevations ranked high in importance relative to all other ecosystems (61% and 72% of all species, respectively). Although other ecosystems are important to various classes or species, none can boast the diverse array of wildlife dependent on riparian areas.

Characteristics of the riparian ecosystem along with the corresponding needs of wildlife interact to support this conclusion. Most wildlife species depend on the availability of good water sources for drinking. Life along riparian zones affords the opportunity to access water while remaining in an area generally abundant in its production of forage and cover. In addition, riparian corridors offer favorable travel lanes between disjunct geographic areas or ecosystems. Some species may utilize riparian zones for many facets of their life requirements while others may only make forays to the areas for specific water or food needs.

Life requisite information assembled in this publication is by no means exhaustive of the available information for each species. However, it provides an insight to particular areas of concern as we strive to maintain healthy wildlife populations.

It has been the intent of the authors to provide this information to land-use planners for the purpose of successfully developing management schemes based on wildlife attributes. Specifically, if a project area is known to support populations of certain species, plans can be developed to preserve critical valued habitat needs and to avoid disturbances to critical areas during crucial time periods. Ecosystems must also be assessed as complete units where impacts to any one species could ultimately determine the fate of another. These precautions will allow for reductions in impacts and will likely help to maintain viable populations of our wildlife inhabitants.

Where there is to be inevitable loss or degradation of habitats, mitigation can help to lessen the impacts. Land-use planners should be aware and willing to include mitigation strategies in project planning. Terrestrial mitigation may address the need to re-establish lost vegetative communities, provide wildlife passage across barriers (conveyors, roads, ditches, etc.), or replace lost water sources. Aquatic mitigation can include maintenance of instream flows, streambank stabilization, or installation of fish passage structures.

There are numerous mitigation alternatives available to the knowledgeable land-use planner. Only by understanding wildlife needs and the relative biological value of ecosystems can planning successfully incorporate mitigation practices. Readers are encouraged to become familiar with Utah Division of Wildlife Resources Publication No. 90-3, "Mitigation Technologies for Man-Made Impacts."

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ASSESSMENT OF BASELINE WILDLIFE DATA BIO/WEST, INC.

Final
Data Adequacy Report
for
Assessment of Baseline Wildlife Data
for
Coastal States Energy Development Corporation

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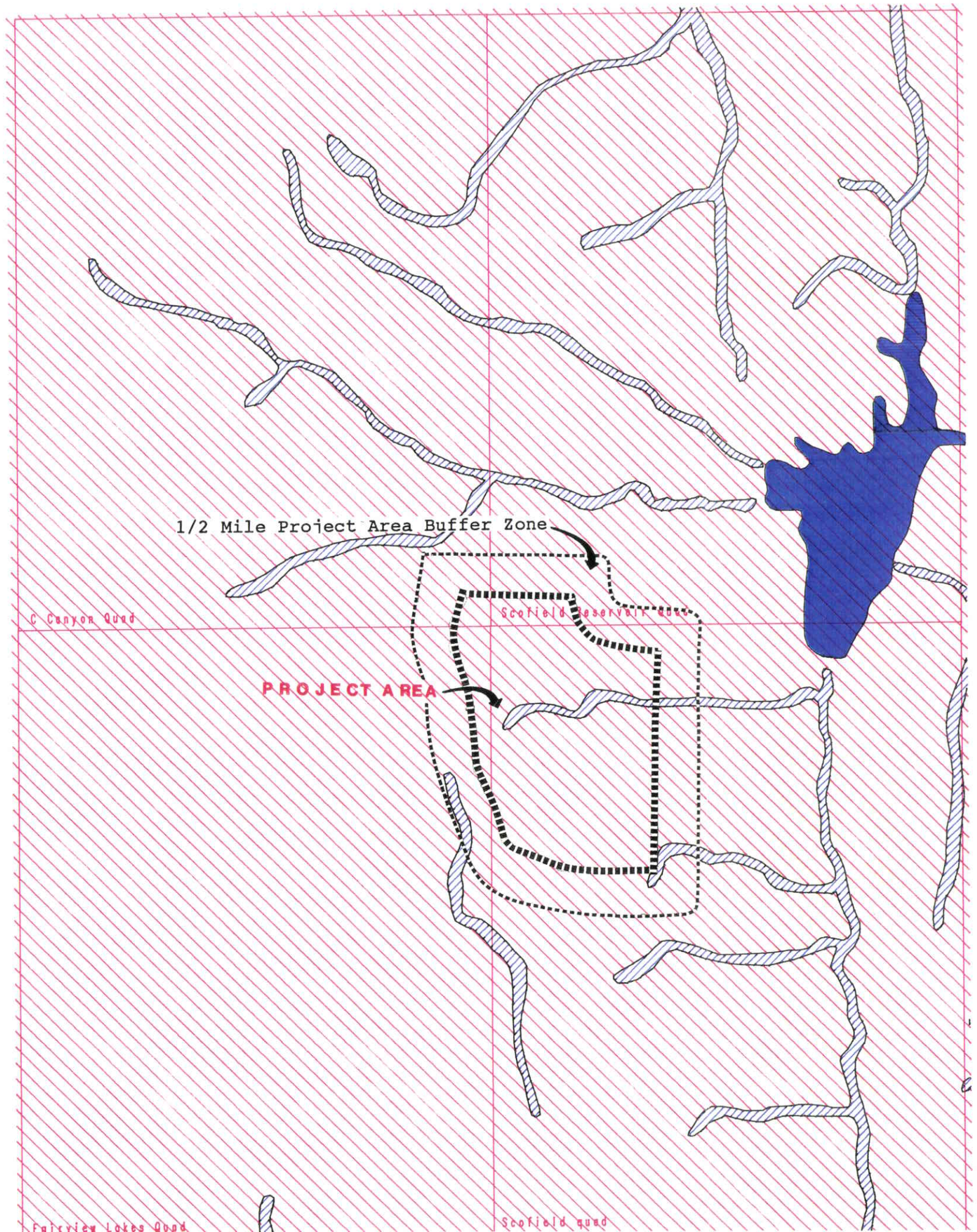


Scofield Reservoir Area Moose Distribution

MAPSCALE 1:100,000

L E G E N D

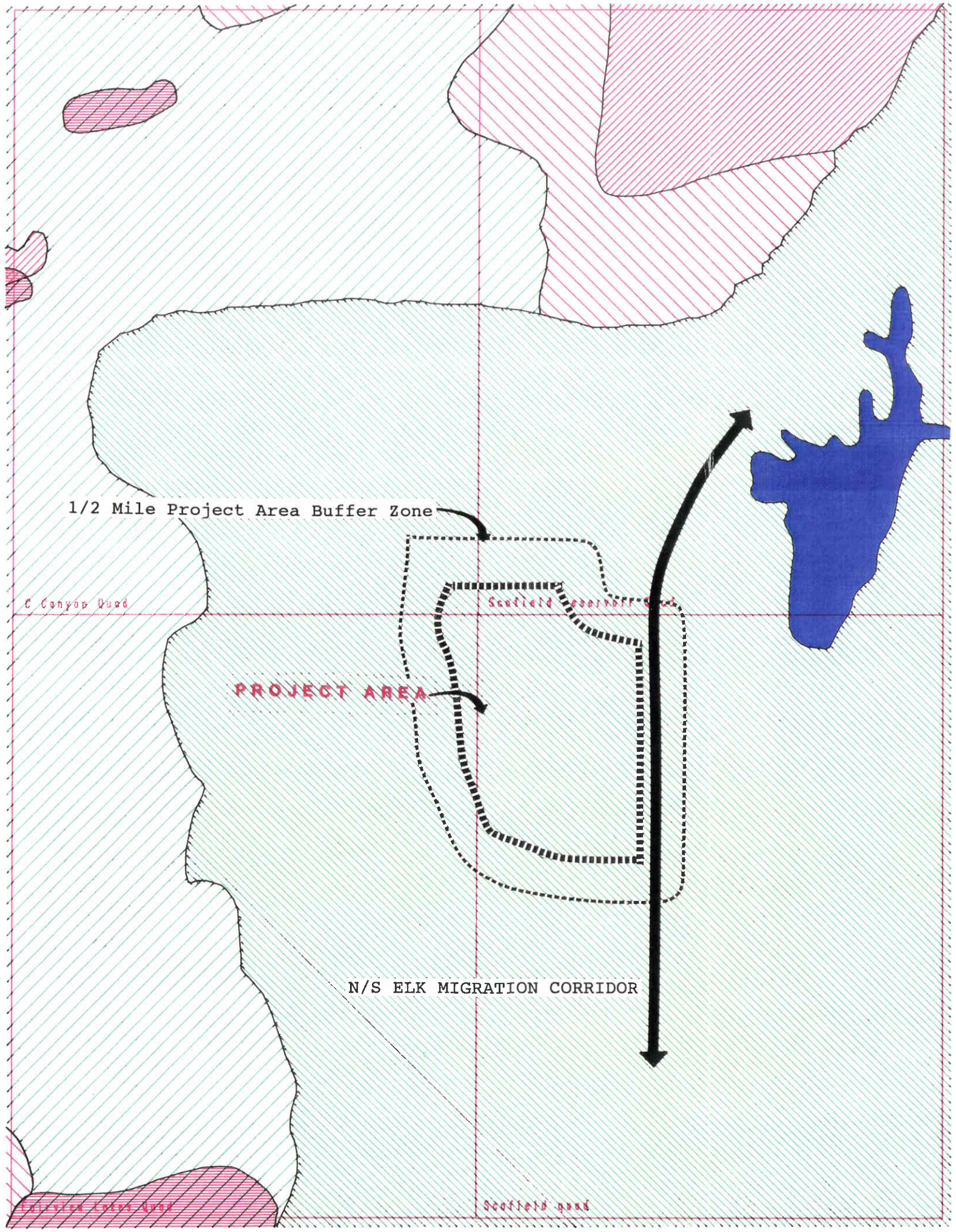
Critical Value Yearlong Area

High Value Winter Area

Figure 3. Regions frequently used by moose within the project and surrounding areas.

Scofield Reservoir Area Elk Distribution

MAPSCALE 1:100,000



LEGEND

- Critical Value Summer Area
- High Value Summer Area
- Critical Value Winter Area
- High Value Winter Area
- Critical Value Calving Area

Figure 2. Regions frequently used by elk within the project and surrounding areas.

Utah Division of Wildlife Resources
Utah Wildlife Information Network - 01/92

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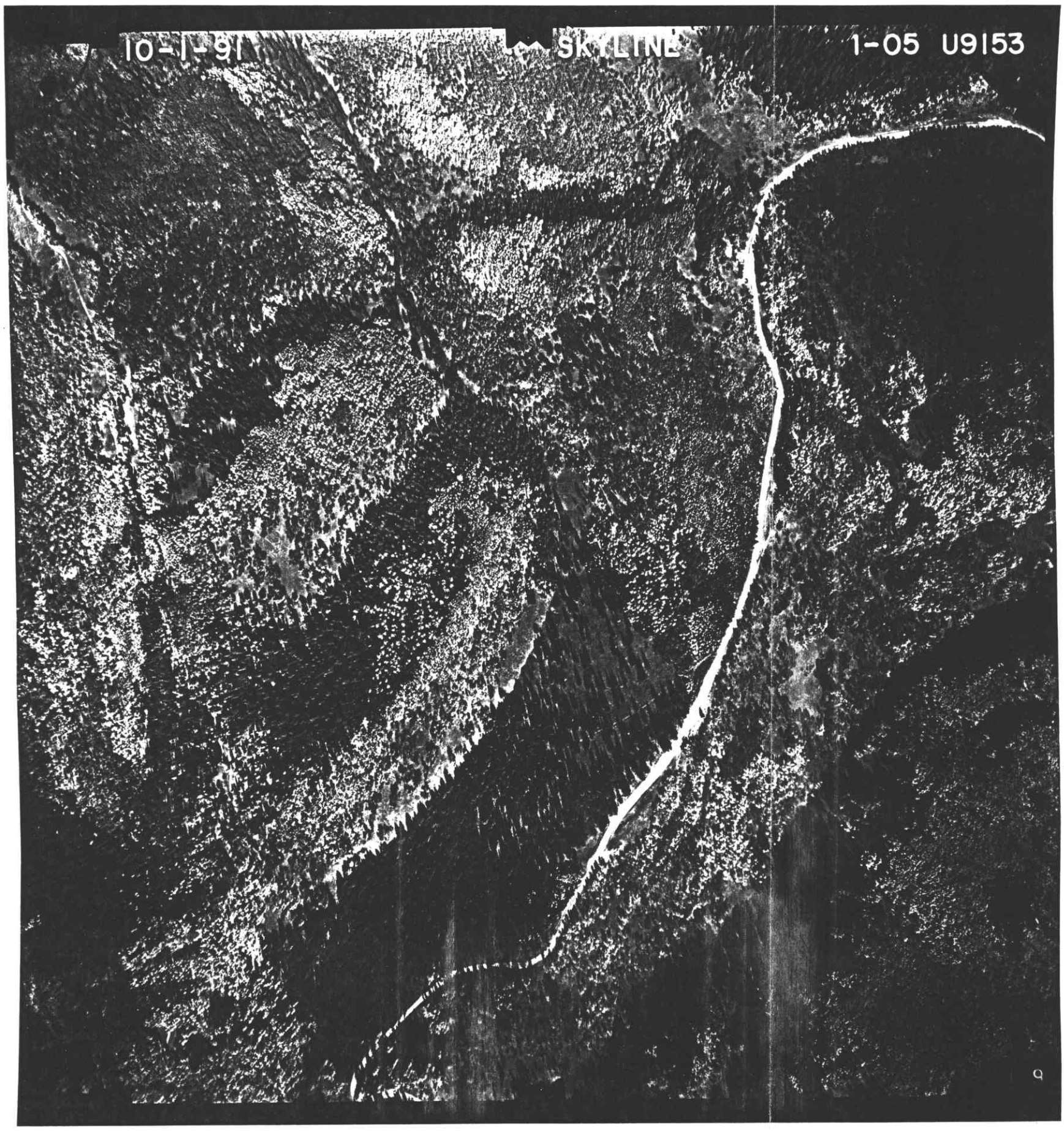
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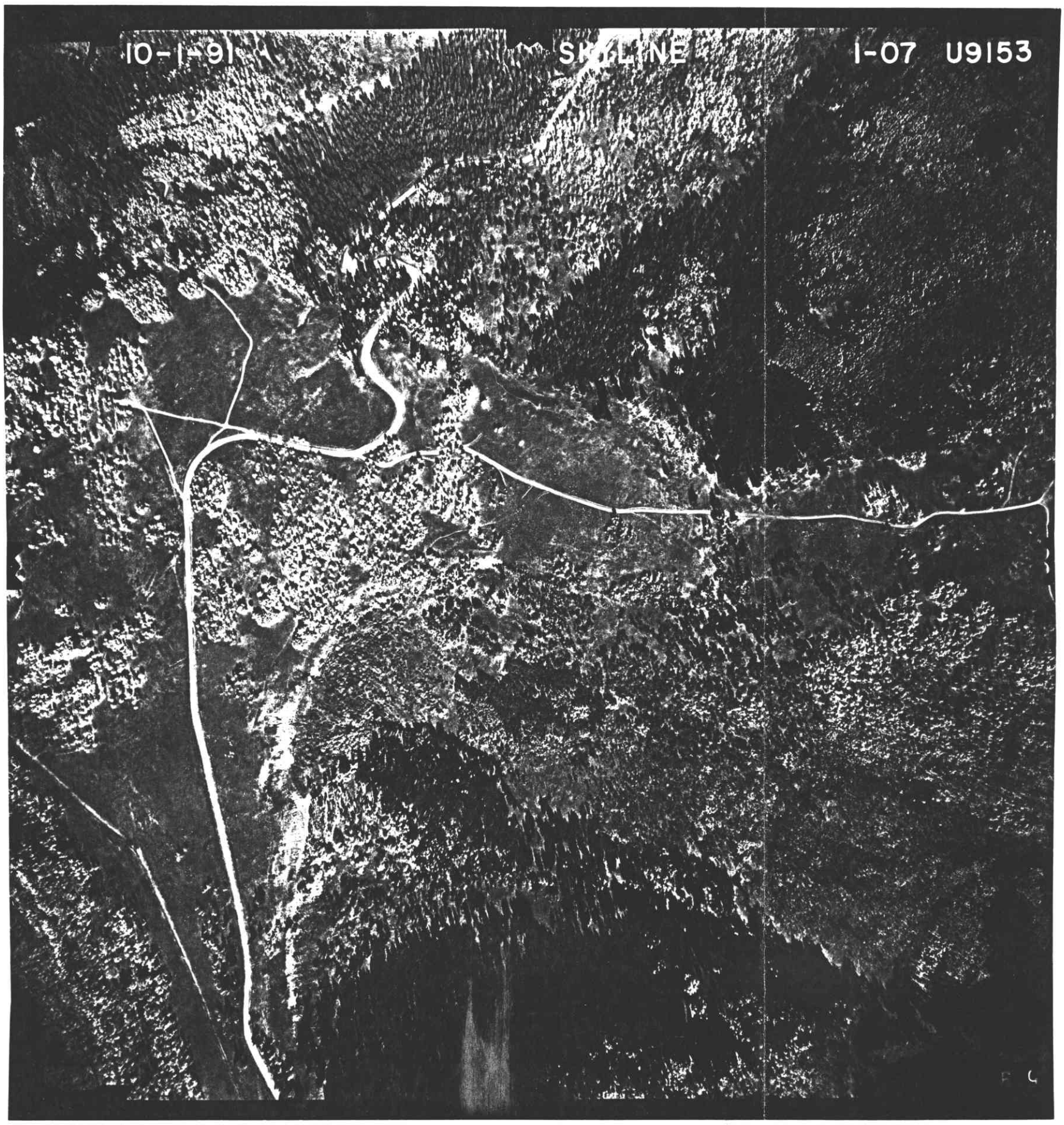
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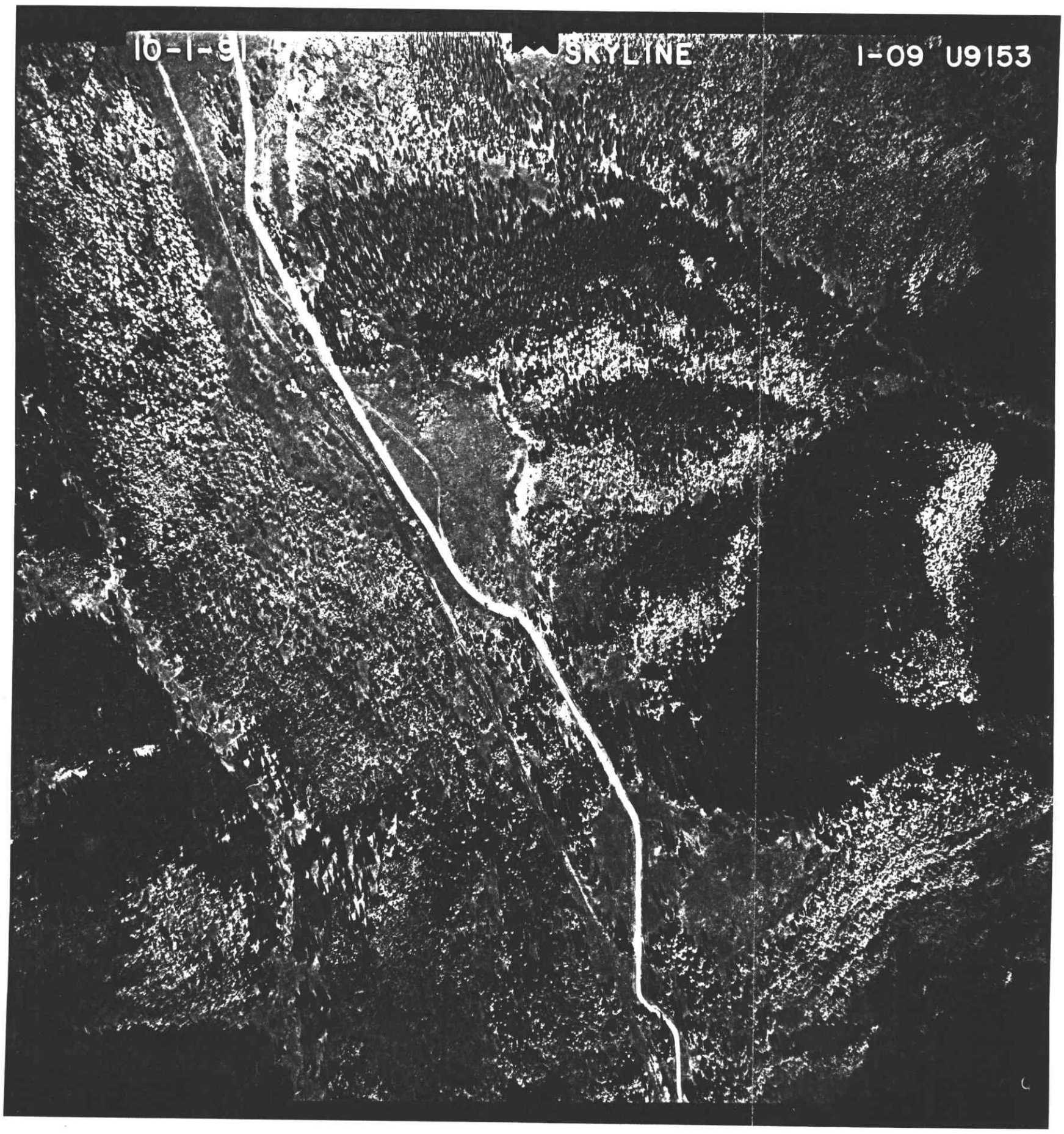
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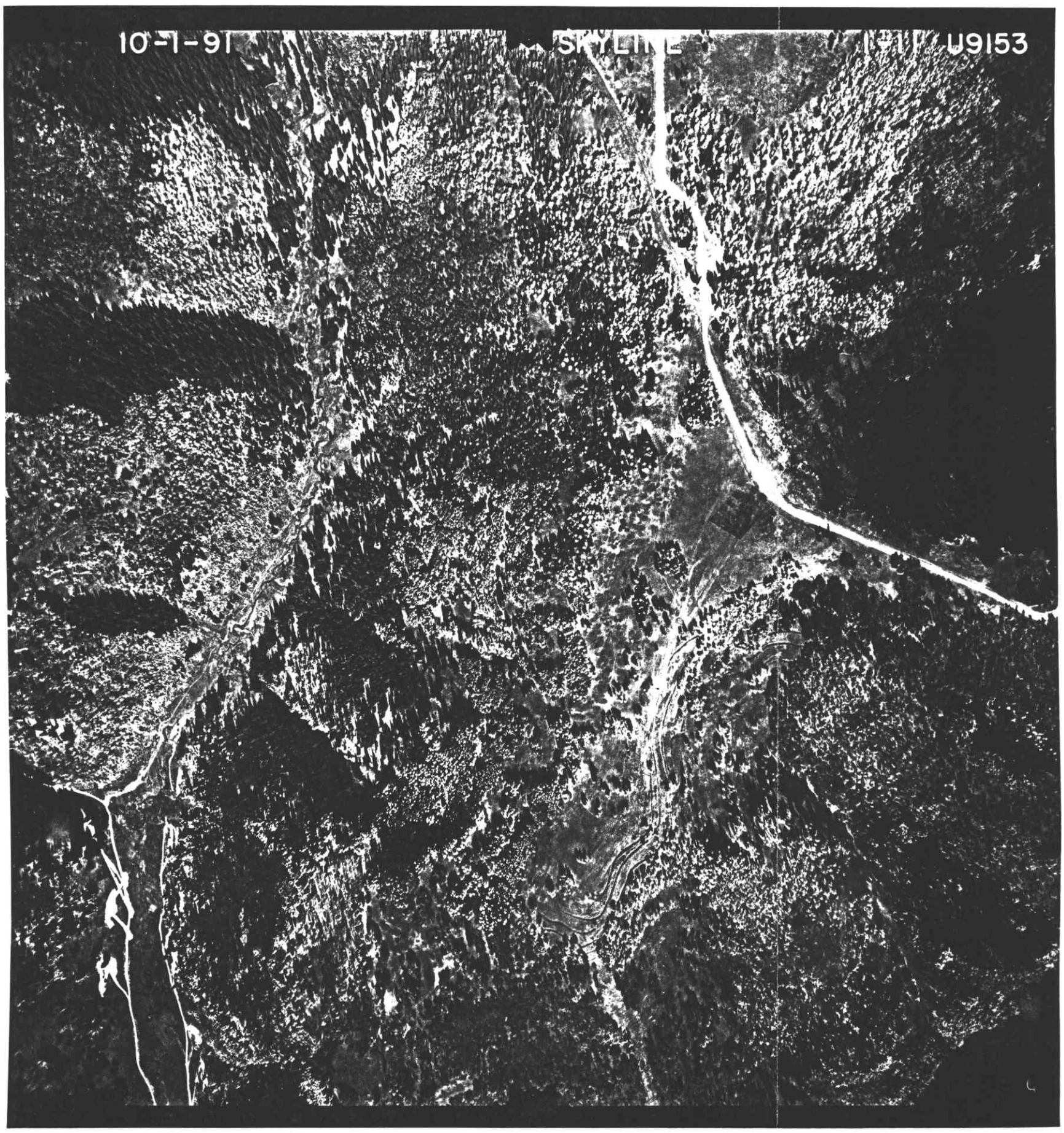
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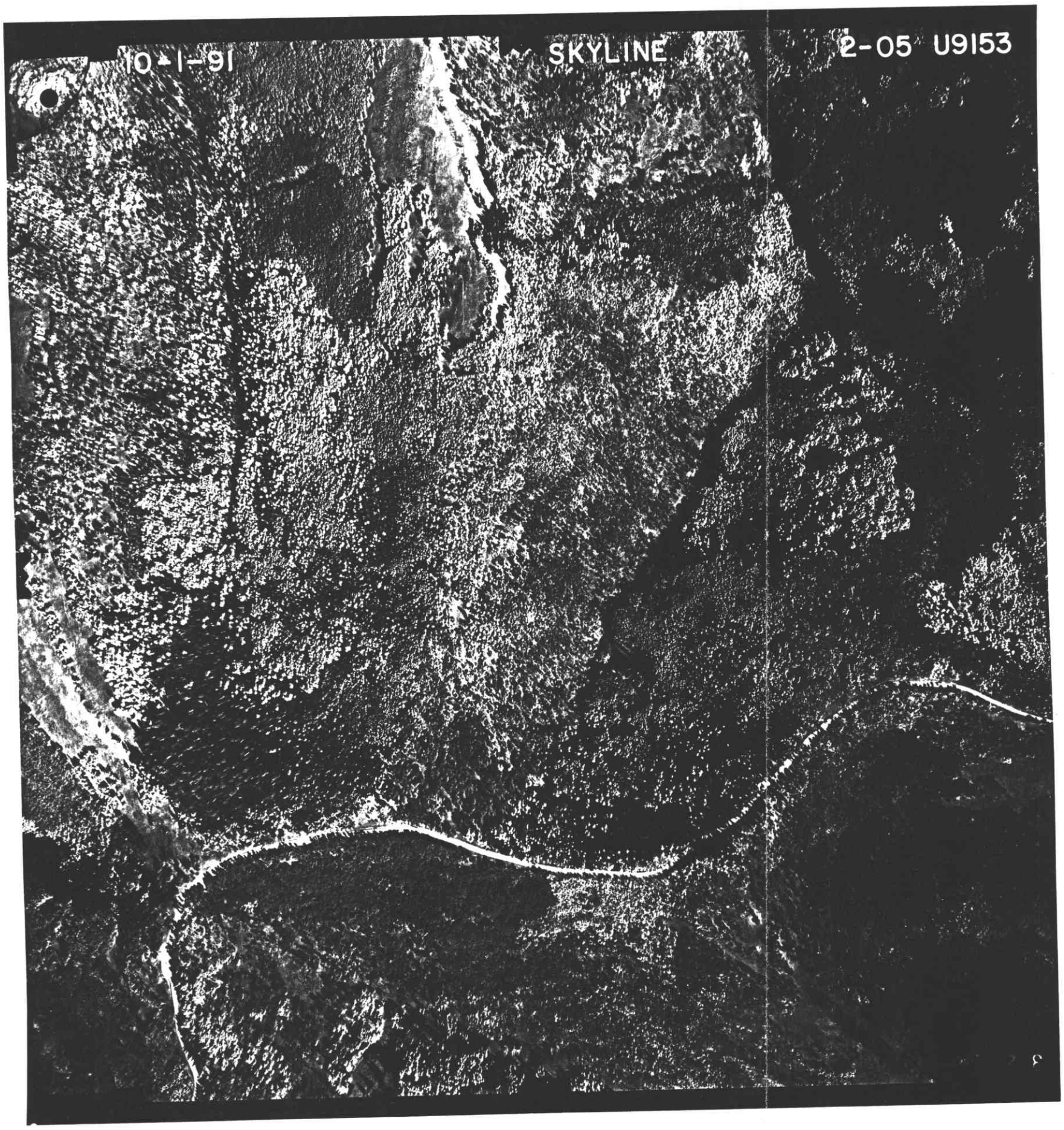
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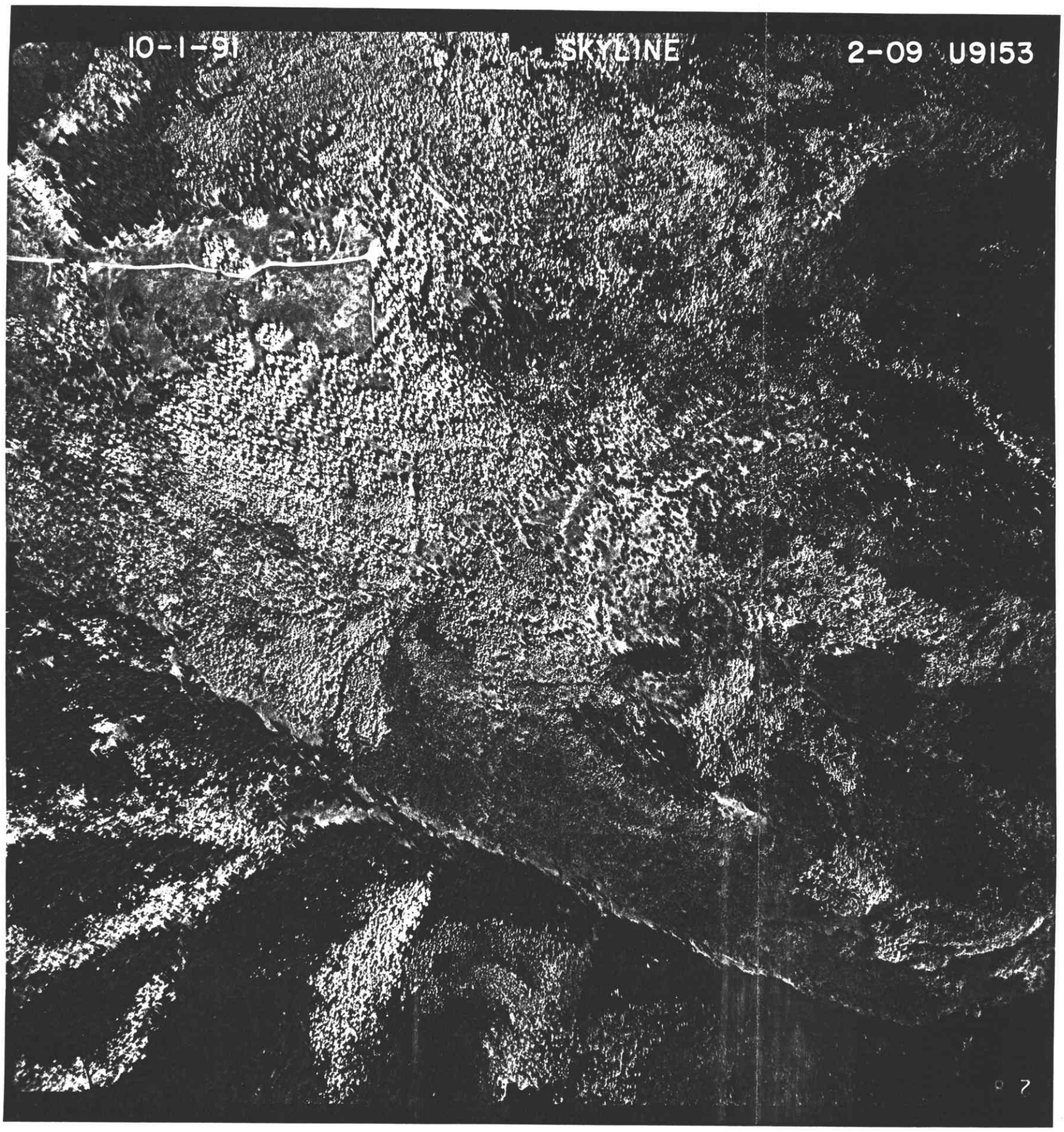
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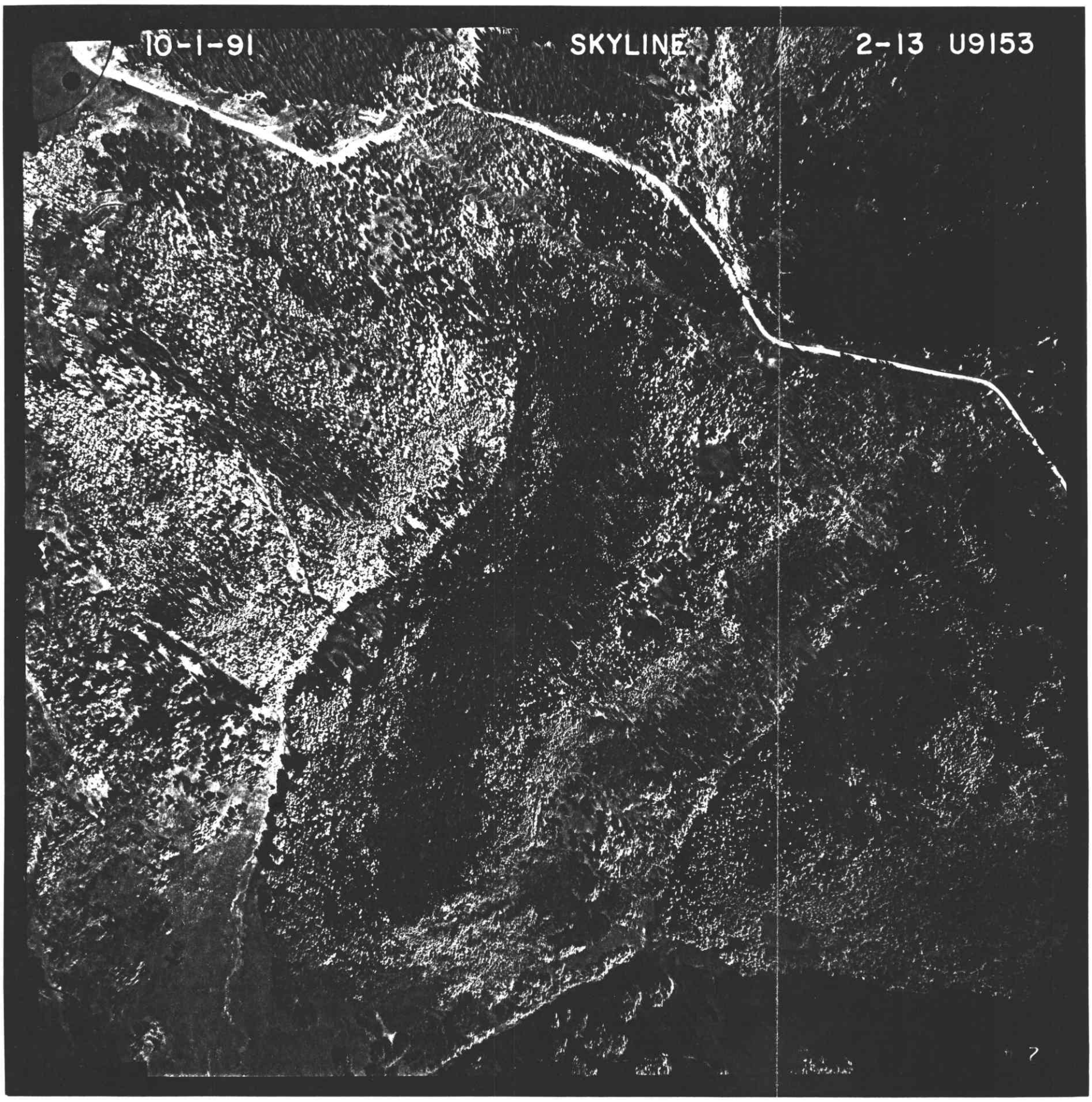
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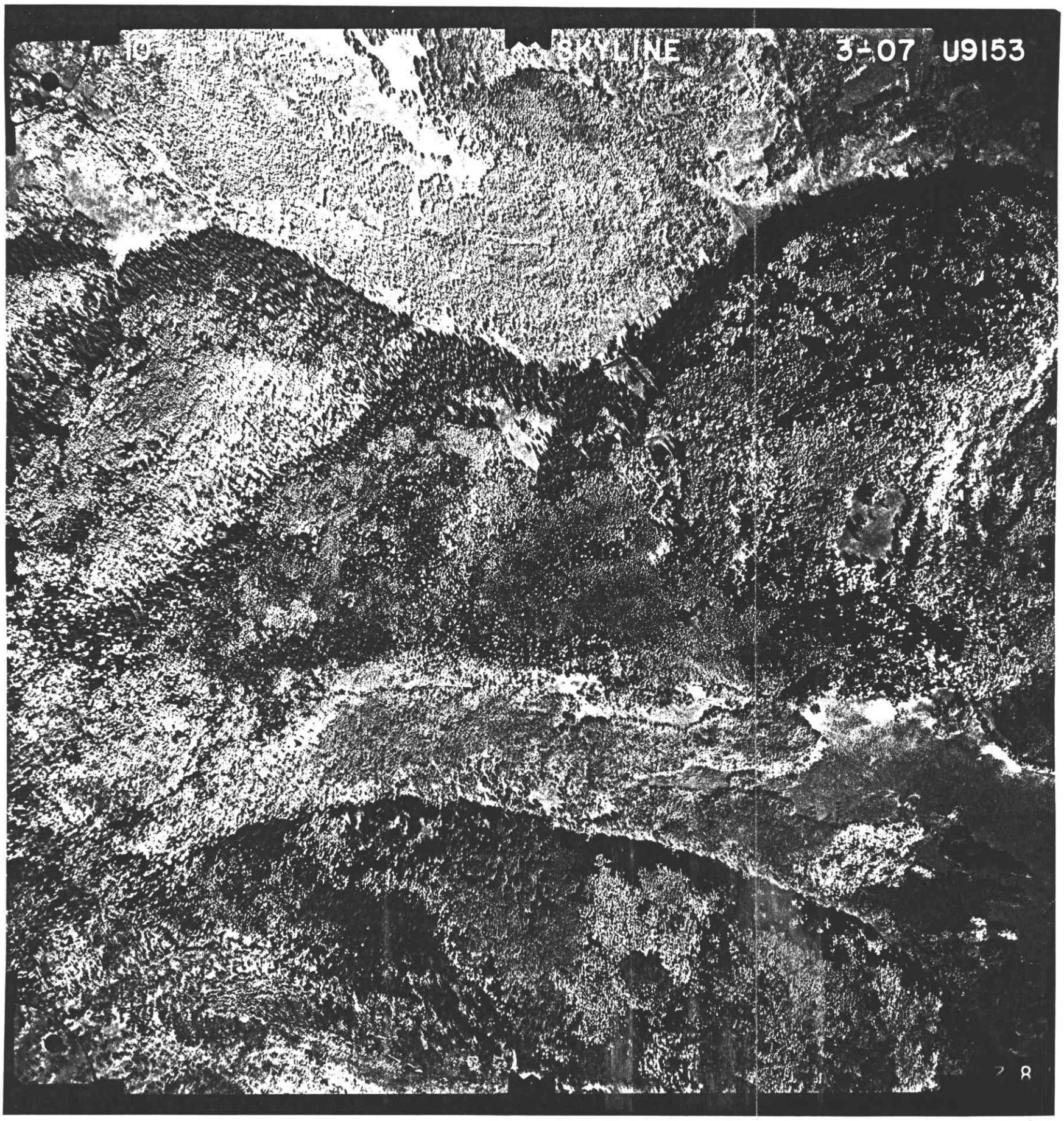
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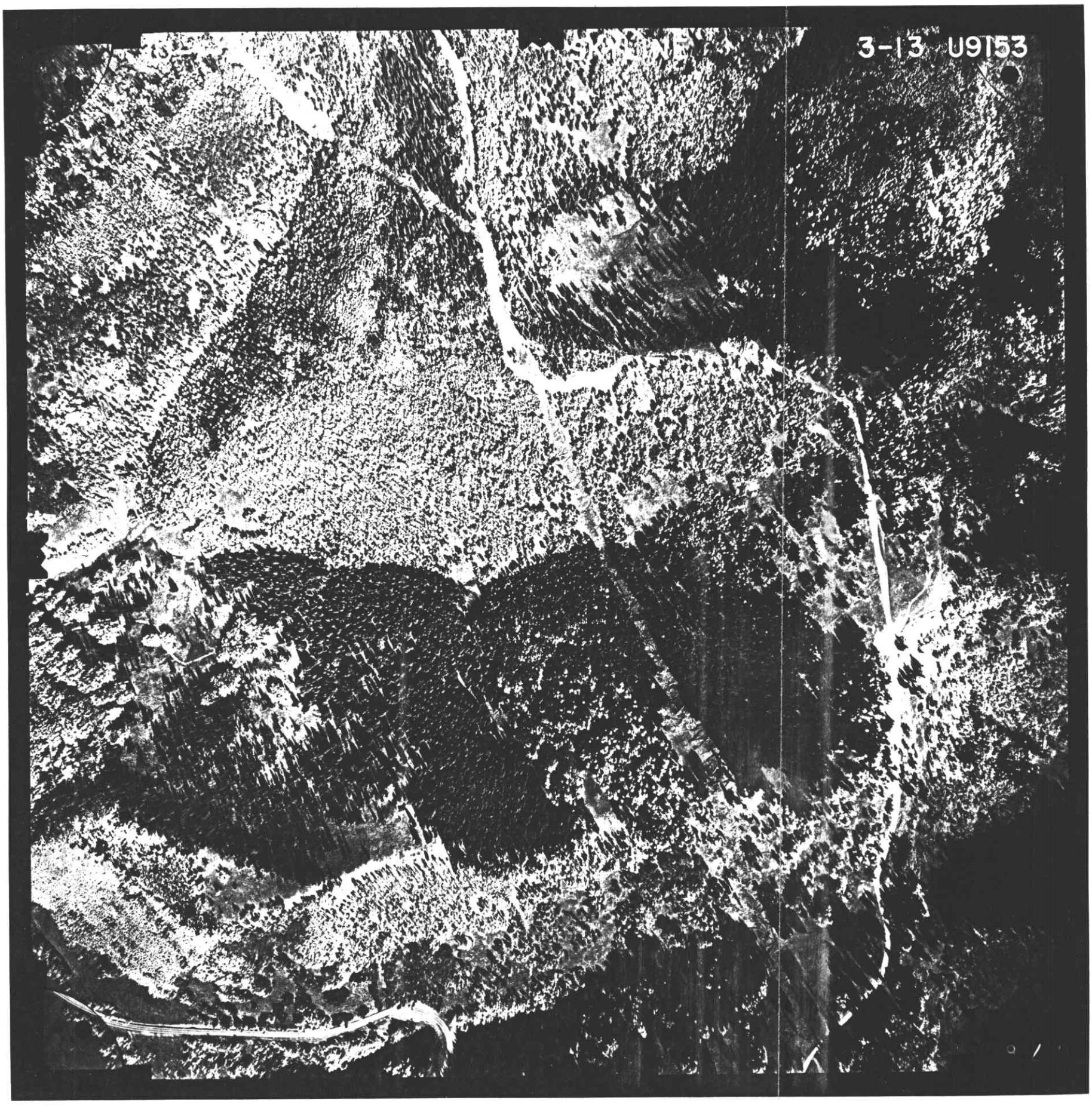
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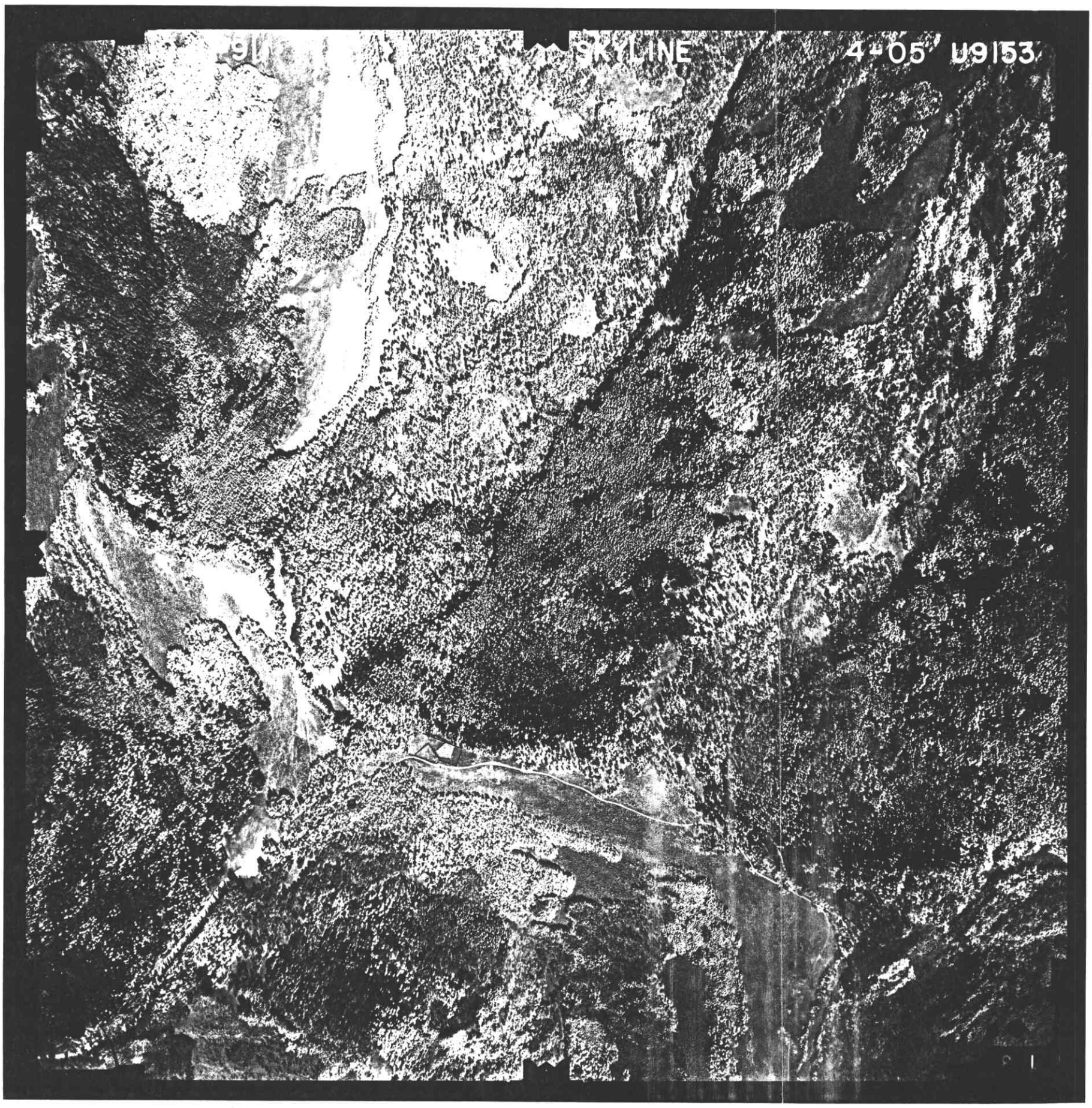
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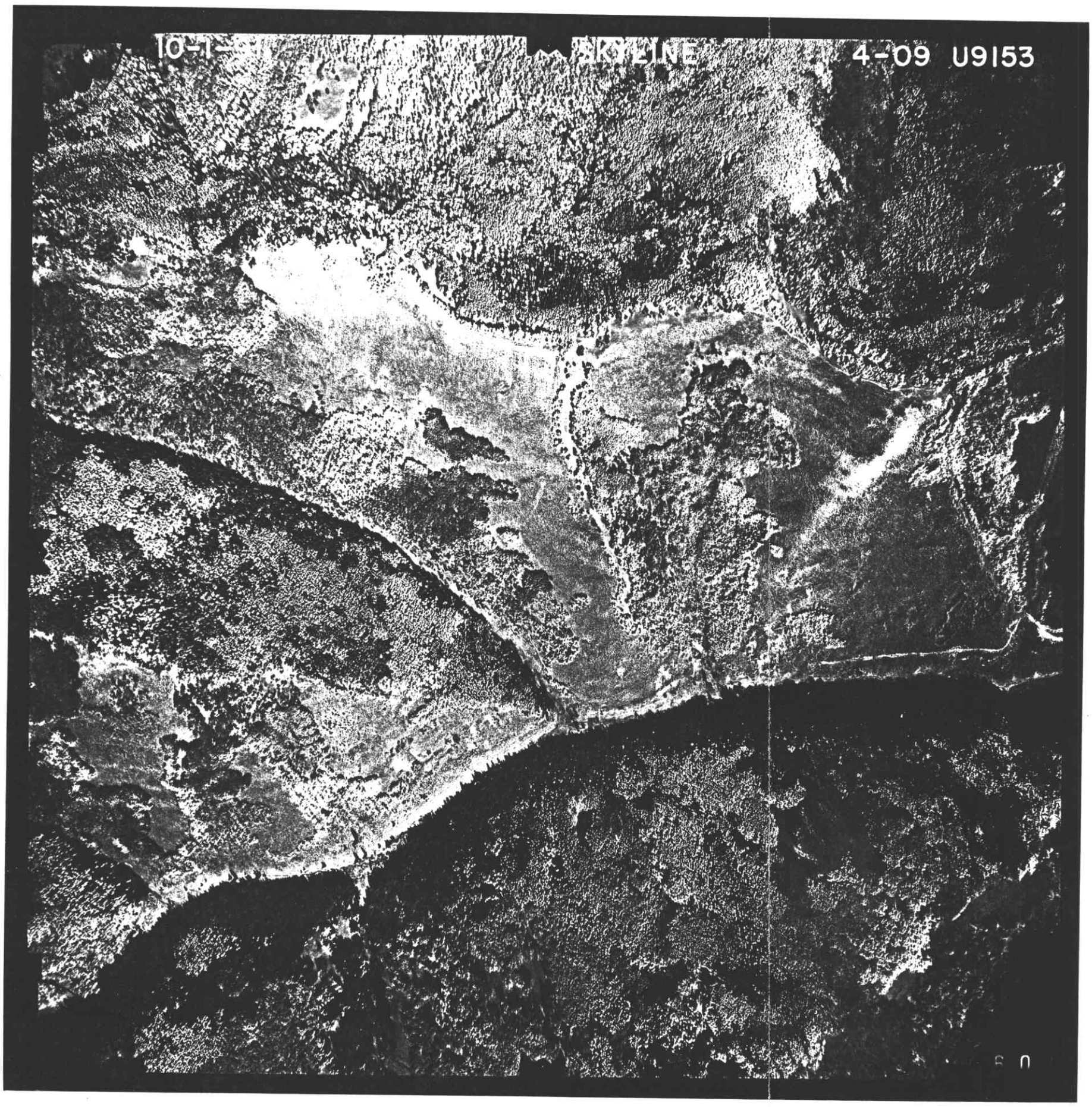
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1.0 INTRODUCTION

1.1 BACKGROUND

Earth Fax Engineering, Inc., of Midvale, Utah, has contracted BIO/WEST, Inc., to compile a data adequacy report for wildlife occurrence on lands located in Sanpete and Carbon Counties in southeastern Utah. The area of interest has been proposed for coal mining activity under a lease expansion request submitted by Coastal States Energy Development Corporation (CSEDC) of Salt Lake City, Utah.

The Manti-LaSal National Forest Headquarters located in Price, Utah, has required CSEDC to comply with the U. S. Bureau of Land Management (USBLM) Data Adequacy Standards for Federal Coal Leasing, Uinta-Southwestern Utah Coal Region, in assessing wildlife species potentially occurring on lands proposed for coal mining. The presence of wildlife, both game and non-game, in Sanpete and Carbon Counties is a significant natural resource providing both economic and recreational benefits. The USBLM data adequacy standards define the general data base that is deemed necessary to make coal leasing and mitigation decisions in the region (USBLM, 1989).

1.2 PROJECT AREA

The proposed expansion area consists of approximately 5,650 acres located southeast of Scofield Reservoir within Manti-LaSal National Forest (Figure 1). Habitat types within the region have been segregated by geographic region and grouped into three ecological associations, cold desert (3,700 - 5,800 feet elevation), submontane (5,500 - 8,500 feet elevation), and montane (6,500 - 12,721 feet elevation)(Dalton, 1990). Elevation in the area of concern ranges from approximately 8,320 - 9,620 feet (Figure 1).

2.0 METHODS

Assessment of wildlife species potentially occurring in the project area consisted of three principal phases: 1) literature review and compilation of available background data, 2) consultation with agency personnel [e.g., U. S. Fish and Wildlife Service (USFWS), U. S. Forest Service (USFS), Utah Division of Wildlife Resources (UDWR)], and 3) aerial surveys of the project area to map existing raptor nests. A list was compiled of wildlife species potentially occurring in the area (Table 1). An indication as to the most likely habitat for occurrence within the project area was completed for each species. Accordingly, wildlife species known to frequent submontane and montane ecosystems were included in Table 1. Based on the boundaries assigned by Dalton (1990), habitat considered as upper submontane (i.e., 8,320 - 8,500 feet elevation) represent the only portion of the submontane ecosystem present within the area of concern.

In addition, an indication of relative abundance (e.g., common, limited, uncommon, occasional, rare) and status (e.g., threatened, endangered, candidate) was assigned to each species listed. A designation of "common" is reserved for species which are widespread and abundant. Species categorized as "limited" are common but restricted to a particular area. Species listed as "uncommon" are widespread but not abundant. Species listed as "occasional" are even less abundant but may periodically occur in the area. A species listed as "rare" indicates it is seldom observed in the area. Those species listed as "threatened" are regarded by USFWS as being threatened with becoming endangered. A species listed as "endangered" is considered by USFWS as being in eminent danger of extinction. A species listed as "candidate" represents a species that is a candidate for official listing as threatened or endangered species by USFWS.

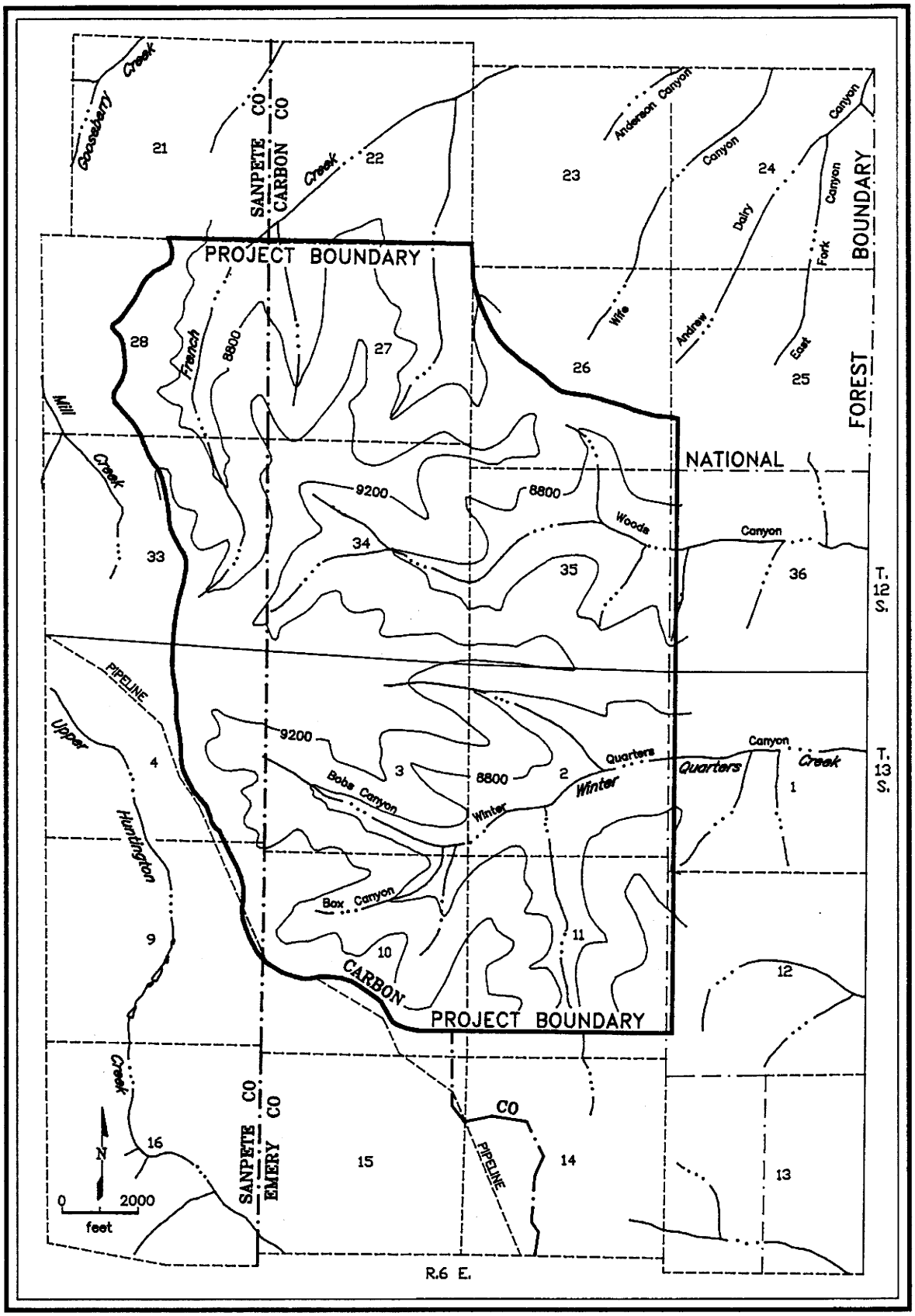

Figure 1. Portions of Sanpete and Carbon Counties, Utah, within Manti–LaSal National Forest proposed for coal mining activity.

Table 1. Wildlife species known to occur within a portion of southeastern Utah proposed for coal mining activities by Coastal States Energy Development Corporation.

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
FISHES		
cutthroat trout[c]	*Oncorynchus clarki*	M[str]
rainbow trout[c]	*Oncorynchos mykiss*	M[str]
common carp[u]	*Cyprinus carpio*	M[str]
Utah chub[l]	*Gila atraria*	M[str]
redside shiner[l]	*Richardsonius balteatus*	M[str]
flannelmouth sucker[u,can]	*Catostomus latipinnis*	SM[str]
mountain sucker[u]	*Catostomus platyrynchus*	SM,M[str]
walleye[o]	*Stizostedion vitreum*	M[str]
AMPHIBIANS		
tiger salamander[c]	*Ambystoma tigrinum*	SM,M[r,str]
Great Basin spadefoot[s]	*Scaphiophus intermontanus*	SM,M[r,str]
western toad[u,can]	*Bufo boreas*	M[r,str]
Great Plains toad[c]	*Bufo cognatus*	SM[r,str]
Woodhouse's toad[c]	*Bufo woodhousii*	SM[r,str]
striped chorus frog[c]	*Pseudacris triseriata*	SM,M[r,str]
northern leopard frog[c]	*Rana pipiens*	SM,M[r,str]
spotted frog[can]	*Rana pretiosa*	SM,M[r,str]
REPTILES		
short-horned lizard[c]	*Phrynosoma douglasii*	SM,M[u]
sagebrush lizard[c]	*Sceloporus graciosus graciosus*	SM,M[u]
eastern fence lizard[c]	*Sceloporus undulatus elongatus*	SM[u]
Great Basin fence lizard[c]	*Sceloporus occidentalis*	SM,M[u,r]
pale leopard lizard[c]	*Gambelia wislizenii*	SM,M[u,r]
northern tree lizard[c]	*Urosaurus ornatus*	SM,M[u,r]
side-blotched lizard[c]	*Uta stansburiana*	SM[u]
Great Basin skink[c]	*Eumeces skiltonianus*	SM,M[u,r]
variable skink[c]	*Eumeces multivirgatus*	SM[u]
rubber boa[u]	*Charina bottae utahensis*	SM,M[u]
Utah mountain kingsnake[u]	*Lampropeltis pyromelana infralabialis*	SM[u,r]
western yellow-bellied racer[u]	*Coluber constrictor mormon*	SM[u,r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
REPTILES (Cont'd)		
regal ringneck snake[u]	*Diadophis punctatus regalis*	SM,M[r]
desert night snake[c]	*Hypsiglena torquata deserticola*	SM[u,r]
Utah milk snake[r]	*Lampropeltis triangulum taylori*	
SM,M[u,r]desert striped whipsnake[c]	*Masticophis taeniatus taeniatus*	SM,M[u,r]
smooth green snake[u]	*Opheodrys vernalis blanchardi*	SM,M[r]
Great Basin gopher snake[c]	*Pituophis melanoleucus deserticola*	SM,M[u]
wandering garter snake[c]	*Thamnophis elegans vagrans*	SM,M[r]
red-sided garter snake[c]	*Thamnophis sirtalis fitchi*	SM,M[u,r]
Great Basin rattlesnake[c]	*Crotalus viridis lutosus*	SM,M[u]
midget faded rattlesnake[u]	*Crotalus viridis concolor*	SM,M[u]
MAMMALS		
masked shrew[c]	*Sorex cinereus*	M[r]
Merriam shrew[u,can]	*Sorex merriami*	SM,M[u,r]
montane shrew[c]	*Sorex monticolus*	SM,M[r]
northern water shrew[c]	*Sorex palustris*	SM,M[r]
vagrant shrew[c]	*Sorex vagrans*	SM,M[r]
pallid bat[c]	*Antrozous pallidus*	SM[u]
big brown bat[c]	*Eptesicus fuscus*	SM,M[u,r]
Rafinesque's big-eared bat[u]	*Plecotus rafinesquii*	M[r]
Townsend's big-eared bat[u]	*Plecotus townsendii*	SM[u,r]
silver-haired bat[c]	*Lasionycteris noctivigans*	M[r]
hoary bat[u]	*Lasiurus cinereus*	SM[u,r]
Brazilian free-tailed bat[u]	*Tadarida braziliensis*	SM[u,r]
long-eared myotis[c]	*Myotis evotis*	SM,M[u,r]
little brown bat[c]	*Myotis lucifugus*	SM,M[u,r]
long-legged myotis[c]	*Myotis volans*	SM,M[u]
small-footed myotis[c]	*Myotis leibii*	SM,M[u]
coyote[c]	*Canis latrans*	SM[u,r]
red fox[u,f]	*Vulpes vulpes*	SM,M[u,r]
gray fox[u,f]	*Urocyon cinereoargenteus*	SM,M[u,r]
mountain lion[u,spg]	*Felis concolor*	SM,M[u,r]
black bear[c,spg]	*Ursus americanus*	SM,M[u,r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
MAMMALS (Cont'd)		
raccoon[c]	*Procyon lotor*	SM[r]
ringtail[c]	*Bassariscus astutus*	SM[r]
North American wolverine[u,can]	*Gulo gulo luscus*	SM,M[u,r]
pine marten[u,f]	*Martes americana*	SM[r]
mink[u,f]	*Mustela vison*	SM[r]
long-tailed weasel[c,f]	*Mustela frenata*	SM,M[r]
badger[c,f]	*Taxidea taxus*	SM,M[u,r]
striped skunk[c,f]	*Mephitis mephitis*	SM,M[r]
spotted skunk[c,f]	*Spilogale putorius*	SM,M[u,r]
bobcat[c,f]	*Lynx rufus*	SM,M[u,r]
North American lynx[u,can]	*Lynx canadensis*	SM,M[u,r]
northern flying squirrel[c]	*Glaucomys sabrinus*	M[u,r]
yellowbelly marmot[c]	*Marmota flaviventris*	SM,M[u]
uintah ground squirrel[c]	*Spermophilus armatus*	SM,M[u]
golden-mantled squirrel[c]	*Spermophilus lateralis*	SM,M[u]
townsend's ground squirrel[c]	*Spermophilus townsendi*	SM,M[u]
white-tailed antelope ground squirrel[c]	*Ammospermophilus leucurus*	SM,M[u]
rock squirrel[c]	*Spermophilus variegatus*	SM[u,r]
whitetail prairie dog[u]	*Cynomys leucurus*	SM,M[u,r]
least chipmunk[c]	*Eutamias minimus*	SM,M[u]
uinta chipmunk[c]	*Eutamias umbrinus*	SM,M[u,r]
cliff chipmunk[c]	*Eutamias dorsalis*	SM,M[u]
red squirrel[c]	*Tamiasciurus hudsonicus*	M[u,r]
northern pocket gopher[c]	*Thomomys talpoides*	SM,M[u,r]
Botta's pocket gopher[c]	*Thomomys bottae*	SM,M[u,r]
Ord's kangaroo rat[c]	*Dipodomys ordii*	SM[u,r]
deer mouse[c]	*Peromyscus maniculatus*	SM,M[u,r]
pinon mouse[c]	*Peromyscus truei*	SM[u]
canyon mouse[c]	*Peromyscus crinitus*	SM,M[u,r]
northern grasshopper mouse[c]	*Onychomys leucogaster*	SM[u]
western harvest mouse[c]	*Reithrodontomys megalotis*	SM[u]
western jumping mouse[c]	*Zapus princeps*	SM,M[u,r]
Great Basin pocket mouse[c]	*Perognathus parvus*	SM[u]
long-tailed vole[c]	*Microtus longicaudus*	SM,M[r]
meadow vole[c]	*Microtus pennsylvanicus*	SM,M[u,r]
water vole[c]	*Microtus richardsoni*	SM,M[r]
montane vole[c]	*Microtus montanus*	SM,M[u,r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
MAMMALS (Cont'd)		
bushy-tailed woodrat[c]	*Neotoma cinerea*	SM[u,r]
desert woodrat[c]	*Neotoma lepida*	SM[u,r]
muskrat[c]	*Ondatra zibethicus*	SM[r]
beaver[c,f]	*Castor canadensis*	SM,M[u,r]
porcupine[c]	*Erethizon dorsatum*	SM,M[u,r]
blacktail jackrabbit[c]	*Lepus californicus*	SM[u]
whitetail jackrabbit[c]	*Lepus townsendii*	SM[u]
snowshoe hare[c,g]	*Lepus americanus*	SM[u]
Nuttall's cottontail[c,g]	*Sylvilagus nuttallii*	SM,M[u,r]
pika[c]	*Ochotona princeps*	SM,M[u,r]
elk[c,g]	*Cervus elephus*	SM,M[u,r]
moose[c,g]	Alces alces	SM,M[u,r]
mule deer[c,g]	*Odocoileus hemionus*	SM,M[u,r]
mountain goat[u,g]	*Oreamnos americanus*	SM,M[u,r]
rocky mountain bighorn sheep[u,g]	*Ovis canadensis*	SM,M[u,r]
BIRDS		
great blue heron[u-su,hi]	*Ardea herodias*	SM[r]
sandhill crane[u-su,hi]	*Grus canadensis*	SM[u,r]
wood duck[u-tr,g]	*Aix sponsa*	SM,M[r,str]
mallard[c-yl,g]	*Anas platyrynchos*	SM[u,r,str]
green winged teal[c-su,g]	*Anas crecca*	SM[r,str]
blue-winged teal[u-su,g]	*Anas discors*	SM[r,str]
lesser scaup[u-tr,g]	*aythya affinis*	SM[r,str]
spotted sandpiper[c-su]	*Actitis macularia*	SM,M[r,str]
willet[u-su]	*Recurvirostra americana*	SM,M[r,str]
common snipe[c-yl]	*Gallinago gallinago*	SM,M[r,str]
long-billed curlew[r-su,hi]	*Numenius americanus*	SM,M[u]
solitary sandpiper[u-tr]	*Charadrius vociferus*	SM,M[r,str]
turkey vulture[c-su]	*Cathartes aura*	SM,M[u]
sharp-shinned hawk[u-yl]	*Accipiter striatus*	SM,M[u,r]
Cooper's hawk[c-yl,hi]	*Accipiter cooperii*	SM,M[u,r]
northern goshawk[u-yl,can]	*Accipiter gentilis*	SM,M[u,r]
osprey[u-su,hi]	*Pandion haliaetus*	SM[r,str]
bald eagle[e]	*Haliaeetus leucocephalus*	SM[r,str]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
BIRDS (Cont'd)		
golden eagle[u-yl,hi]	*Aquila chrysaetos*	SM,M[u,r]
northern harrier[u-su]	*Circus cyaneus*	SM[u,r]
red-tailed hawk[c-yl]	*Buteo jamaicensis*	SM[u]
Swainson's hawk[u-su]	*Buteo swainsoni*	SM[u]
rough-legged hawk[c-win]	*Buteo lagopus*	SM[u,r]
ferruginous hawk[u-yl,can,hi]	*Buteo regalis*	SM[u]
American kestrel[c-su]	*Falco sparverius*	SM[u,r]
merlin[u-yl,hi]	*Falco columbarius*	SM,M[u,r]
peregrine falcon[e,hi]	*Falco peregrinus*	SM,M[u,r]
prairie falcon[u-yl,hi]	*Falco mexicanus*	SM,M[u,r]
chukar[c-yl,g]	*Colinus virginianus*	SM[u]
ruffed grouse[c-yl,g]	*Bonasa umbellus*	SM,M[u,r]
blue grouse[c-yl,g]	*Dendragapus obscurus*	SM,M[u]
sage grouse[c-yl,g]	*Centrocercus urophasianus*	SM[u]
mourning dove[c-su,g]	*Zenaida macroura*	SM,M[u,r]
rock dove[c-yl]	*Columba livia*	SM[u]
band-tailed pigeon[o-su,hi]	*Columba fasciatus*	SM,M[u,r]
yellow-billed cuckoo[u-su]	*Coccyzus americanus*	SM[u,r]
northern saw-whet owl[u-yl]	*Aegolius acadicus*	SM,M[u,r]
long-eared owl[c-yl]	*Asio otus*	SM,M[u,r]
short-eared owl[c-yl]	*Asio flammeus*	SM,M[u,r]
great horned owl[c-yl]	*Bubo virginianus*	SM,M[u,r]
snowy owl[r-win]	*Nyctea scandiaca*	SM,M[u,r]
burrowing owl[u-su,hi]	*Athene cuniculata*	SM[u]
Mexican spotted owl[u-yl,can,hi]	*Strix occidentalis lucida*	SM,M[u,r]
northern pygmy owl[u-yl]	*Glaucidium gnoma*	SM,M[u,r]
flammulated owl[u-su,hi]	*Otus flammeolus*	M[u]
western screech owl[u-yl]	*Otus kennicotti*	SM,M[u,r]
common nighthawk[c-su]	*Chordeiles minor henryi*	SM,M[u,r]
common poorwill[c-su]	*Phalaehoptilus nuttallii*	SM[u]
white-throated swift[c-su]	*Aeronautes saxatalis*	SM[u,r]
black swift[u-su,hi]	*Cypseloides niger*	SM,M[u,r]
black-chinned hummingbird[c-su]	*Archilochus alexandri*	SM[u,r]
broad-tailed hummingbird[c-su]	*Selasphorus platycercus*	SM,M[u,r]
rufous hummingbird[c-su]	*Selasphorus rufus*	SM,M[u,r]
calliope hummingbird[u-su]	*Stellula calliope*	SM,M[u,r]
belted kingfisher[u-yl]	*Ceryle alcyon*	SM,M[r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
BIRDS (Cont'd)		
northern flicker[c-yl]	*Colaptes auratus*	SM,M[u,r]
downy woodpecker[c-yl]	*Picoides pubescens*	M[u,r]
three-toed woodpecker[u-yl]	*Picoides tridactylus*	SM,M[u,r]
hairy woodpecker[c-yl]	*Picoides villosus*	M[u,r]
Williamson's sapsucker[r-su,hi]	Sphyrapicus thyroideus	SM,M[u]
red-naped sapsucker[c-yl]	*Sphyrapicus nuchalis*	SM,M[u,r]
yellow-bellied sapsucker[c-yl]	*Sphyrapicus varius*	SM,M[u,r]
olive-sided flycatcher[u-su]	*Contopus borealis*	M[u,r]
western wood-peewee[c-su]	*Contopus sordidulus*	SM,M[u,r]
western flycatcher[c-su]	*Empidonax difficilis*	SM,M[u,r]
Hammond's flycatcher[u-su]	*Empidonax hammondii*	M[u,r]
dusky flycatcher[c-su]	*Empidonax oberholseii*	SM,M[u,r]
gray flycatcher[c-su]	*Empidonax wrightii*	SM[u]
Say's phoebe[c-yl]	*Sayornis saya*	SM[u]
ash-throated flycatcher[c-su]	*Myiarchus cinerascens*	SM[u,r]
horned lark[c-yl]	*Eremophila alpestris*	SM[u]
Cassin's kingbird[u-su]	*Tyrannus vociferous*	SM,M[u,r]
western kingbird[c-su]	*Tyrannus verticalis*	SM,M[u,r]
cliff swallow[c-su]	*Hirundo pyrrhonata*	SM,M[u,r]
barn swallow[c-su]	*Hirundo rustica*	SM[u,r]
purple martin[r-su]	*Pogne subis*	M[u]
tree swallow[c-su]	*Tachycineta bicolor*	SM,M[u,r]
violet-green swallow[c-su]	*Tachycineta thalassina*	SM,M[u,r]
scrub jay[c-yl]	*Aphelocoma coerulescens*	SM[u]
common raven[c-yl]	*Corvus corax*	SM,M[u]
American crow[c-yl]	*Corvus brachyrynchos*	SM[u,r]
Steller's jay[c-yl]	*Cyanocitta stelleri*	M[u]
pinyon jay[c-yl]	*Gymnorhinus cyanocephalus*	SM[u]
Clark's nutcracker[c-yl]	*Nucifraga columbiana*	SM,M[u]
gray jay[u-yl]	*Perisoreus cavadensis*	SM,M[u]
black-billed magpie[c-yl]	*Pica pica*	SM,M[u,r]
black-capped chickadee[c-yl]	*Parus atricapillus*	SM,M[u,r]
mountain chickadee[c-yl]	*Parus gambeli*	SM,M[u]
plain titmouse[u-yl]	*Parus inornatus*	SM[u]
bushtit[c-yl]	*Psaltriparus minimus*	SM[u,r]
red-breasted nuthatch[c-yl]	*Sitta canadensis*	M[u]
white-breasted nuthatch[c-yl]	*Sitta carolinensis*	SM,M[u,r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
BIRDS (Cont'd)		
pygmy nuthatch[c-yl]	*Sitta pygmaea*	M[u]
brown creeper[c-yl]	*Certhia americana*	M[u]
rock wren[c-yl]	*Salpinctes obsoletus*	SM,M[u]
Bewick's wren[c-yl]	*Thryomanes bewickii*	SM[u,r]
house wren[c-su]	*Troglodytes aedon*	SM,M[u,r]
American dipper[c-yl]	*Cinclus mexicanus*	SM,M[r]
blue-gray gnatcatcher[c-su]	*Polioptila caerulea*	M[u,r]
ruby-crowned kinglet[c-yl]	*Regulus calendula*	SM,M[u,r]
golden-crowned kinglet[u-yl]	*Regulus satrapa*	SM,M[u,r]
hermit thrush[c-su]	*Catharus guttatus*	SM,M[u,r]
Swainson's thrush[c-su]	*Catharus ustulatus*	SM,M[u,r]
Townsend's solitaire[c-su]	*Myadestes townsendi*	SM,M[u,r]
mountain bluebird[c-yl]	*Sialia cursucoides*	SM,M[u,r]
western bluebird[r-yl,hi]	*Sialia mexicana*	SM,M[u]
American robin[c-yl]	*Turdus migratorius*	SM,M[u,r]
cedar waxwing[c-w]	*Bombycilla cedrorum*	SM[u,r]
bohemian waxwing[u-w]	*Bombycilla garrulus*	SM,M[u,r]
northern shrike[u-w,can]	*Lanius excubitor*	SM[u,r]
loggerhead shrike[c-yl]	*Lanius ludovicianus*	SM,M[u,r]
sage thrasher[u-su]	*Oreoscoptes montanus*	SM[u]
water pipit[u-su]	*Anthus spinolettus*	SM,M[u,r]
European starling[c-yl]	*Sturnus vulgaris*	SM[u,r]
warbling vireo[c-su]	*Vireo gilvus*	M[u,r]
solitary vireo[c-su]	*Vireo solitarius*	SM[u,r]
yellow-rumped warbler[c-su]	*Dendroica coronata*	M[u,r]
magnolia warbler[r-tr]	*Dendroic magnolia*	M[u]
black-throated gray warbler[c-su]	*Dendroica nigrescens*	SM[u,r]
yellow warbler[c-su]	*Dendroica petechia*	SM,M[u,r]
Townsend's warbler[u-tr]	*Dendroica townsendi*	M[u]
Macgillivray's warbler[c-su]	*Oporns tolmeii*	SM,M[u,r]
orange-crowned warbler[c-su]	*Vermivora celata*	SM,M[u,r]
nashville warbler[u-tr]	*Vermivora ruficapilla*	SM[r]
Virginia's warbler[c-su]	*Vermivora virginiae*	SM[u,r]
Wilson's warbler[c-su]	*Wilsonia pusilla*	SM,M[u,r]
yellow-breasted chat[c-su]	*Icteria virens*	SM[u,r]
western tanager[c-su]	*Piranga ludoviciana*	SM[u,r]
lazuli bunting[c-su]	*Passerina amoena*	SM,M[r]

Table 1. (Cont'd).

SPECIES[1]	SCIENTIFIC NAME	HABITAT[2]
BIRDS (Cont'd)		
black-headed grosbeak[c-su]	*Pheucticus melanocephalus*	SM,M[u,r]
dark-eyed junco[c-yl]	*Junco hyemalis*	SM,M[u,r]
Lincoln's sparrow[u-su]	*Melospiza lincolnii*	SM[u,r]
song sparrow[c-yl]	*Melospiza melodia*	SM,M[r]
fox sparrow[u-su]	*Passerella iliaea*	SM,M[u,r]
green-tailed towhee[c-su]	*Pipilio chlorurus*	SM[u,r]
vesper sparrow[c-su]	*Pooecetes gramineus*	SM,M[u]
chipping sparrow[c-su]	*Spizella passerina*	SM,M[u,r]
white-crowned sparrow[c-yl]	*Zonotrichia leucophrys*	SM,M[u,r]
American tree sparrow[u-w]	*Tachycineta bicolor*	SM,M[u,r]
lesser goldfinch[u-su]	*Carduelis psaltria*	SM,M[u,r]
American goldfinch[c-yl]	*Carduelis tristis*	SM,M[u,r]
red crossbill[u-yl]	*Loxia curvirostria*	M[u,r]
common redpoll[c-yl]	*Carduelis flammea*	SM[r]
pine siskin[c-yl]	*Carduelis pinus*	SM,M[u]
black rosy finch[u-yl]	*Leucosticte arctoa*	SM,M[u,r]
Cassin's finch[c-yl]	*Carpodacus cassinii*	SM,M[u,r]
house finch[c-yl]	*Carpodacus mexicanus*	SM[u,r]
evening grosbeak[c-w]	*Coccothraustes vespertinus*	M[u]
pine grosbeak[u-yl]	*Pinicola enucleator*	SM,M[u,r]

[1]c = common; u = uncommon; l = limited; o = occasional; r = rare; t = threatened species; pt = species proposed for threatened listing; e = endangered species; can = candidate species; yl = year long resident; su = summer resident; w = winter resident; tr = transient; f = furbearer; g = game species; spg = special game species; hi = species of high federal interest.
[2]SM = submontane; M = montane; u = upland habitats; r = riparian habitats; str = streams.

Avian species potentially occurring within the area of concern were rated further according to their seasonal status (i.e., yearlong resident, summer resident, winter resident and transients). Transient species only occur within the area during spring and/or fall migration periods and do not remain for any extended period of time. Winter or summer use areas for big game were mapped to show use patterns in relation to the proposed area. Discussion of wildlife associated with each ecosystem is based on consultation with agency personnel and literature review.

2.1 LITERATURE REVIEW

Literature review included examination of reports supplied by Earth Fax Engineering and examination of literature and reports within the public domain. Public domain sources included examination of existing literature available from the Utah Division of Wildlife Resources and the Utah Museum of Natural History.

3.0 SUMMARY OF EXISTING DATA

3.1 FISHES

No background information is known to exist on the occurrence of fishes within the project area. At least eight species potentially occur in drainages located within the project area (Dalton, 1990). Redside shiner and mountain sucker are reported to occur in the creeks of Winter Quarters Canyon (Dames and Moore, 1990). Scofield Reservoir and portions of surrounding drainages, including those within the project area, were treated to remove common carp and walleye during 1990, and the potential for Utah chub within the project area is low (K. Phippen, pers. comm.).

3.2 HERPETOFAUNA

No background information is known to exist on the occurrence of reptiles and amphibians within the project area. However, the waters and surrounding areas of French Creek, and the creeks in Woods and Winter Quarters Canyons provide potential habitat for a variety of reptiles and amphibians. At least eight species of amphibians and 23 species of reptiles potentially occur within the project area. Most of the herpetofauna that potentially occur in the project area are categorized as common species (Table 1; see Dalton 1990).

3.3 MAMMALS

No specific list of mammals occurring within the project area is known to occur. However, at least 73 species potentially occur in the area on a seasonal or year-round basis (Table 1; Dalton, 1990).

3.3.1 FURBEARERS

Ten furbearers potentially occur within the project area (Table 1; Dalton 1990; UDWR, 1990). Beaver occur throughout portions of northern Utah, and the number of individuals occurring in a given area is determined by the composition of riparian habitat associated with preferred streams (Rawley, 1982). Potential habitat for beaver exists within the project area.

Mink are found in the vicinity of streams, lakes or marshy areas, and numbers of individuals are limited to approximately 22 animals per square mile of suitable habitat. Mink are carnivorous, and muskrat are considered a preferred prey item (Rawley, 1982).

Pine marten are found at elevations between 7,000 - 11,000 feet along the Wasatch Plateau. The species is almost entirely carnivorous, with the preferred prey item being red squirrel (Rawley, 1982).

Of the furbearers potentially occurring in the project area, ringtail, long-tailed weasel, and mink prefer habitats along streams and in riparian zones. Marten, badger, striped skunk, and spotted skunk prefer remote habitats at higher elevations and semiopen areas associated with brushlands and woodlots, or sparsely wooded areas along streams (Nelson et al., 1980).

3.3.2 GAME SPECIES

Nine game species of mammals potentially occur within the project area (Table 1). Of these, the mountain lion and black bear are classified as special game species by UDWR (Rawley, 1982). The bobcat was previously classified as a special game species by UDWR (Rawley, 1982), but more recently has been included in the list of furbearers for Utah (UDWR, 1990).

3.3.2.1 BIG GAME SPECIES

At least five species of big game potentially occur within the project area, with three species (i.e., moose, elk, and mule deer) occurring on a regular basis. The entire project area is categorized as high value summer habitat for mule deer (D. Foster, pers. comm.).

The entire project area is also categorized as critical value summer habitat for elk (Figure 2; D. Foster, pers. comm.). Elk calving occurs throughout the entire project area, and critical value winter habitat is located to the north (Jones, 1990; Figure 2). At least one elk migration route occurs within the project area (Figure 2). Elk migrate through the project area during spring migration periods while enroute from Spanish Fork Canyon to East Mountain (Jones, 1990).

The entire area is considered high value winter habitat for moose, and riparian zones along the creek in Woods Canyon are categorized as critical value yearlong habitat for moose (Figure 3; D. Foster, pers. comm.). No information was available on actual use of the project area by moose.

3.4 BIRDS

No specific list of birds occurring within the project area is known to exist. A list of potential species for the project area includes 147 species that may occur either seasonally or yearlong (Table 1; Dalton, 1990; D. Foster, pers. comm.). Of these, at least 67 species are considered as permanent residents (Table 1).

3.4.1 MIGRATORY AND UPLAND GAME SPECIES

Utah lies along the eastern edge of the Pacific Flyway and near the western edge of the Central Flyway. Abundant numbers of both waterfowl and shorebirds can be expected to occur in almost any area associated with open water and wetland habitats (Behle, 1985). Accordingly, considerable potential exists for numerous shorebirds to seasonally occur on nearby Scofield Reservoir and along the creeks in Woods and Winter Quarters Canyon, as well as along French Creek. Herons, egrets and considerable numbers of migrant passerines can be expected to occur seasonally within the project area.

At least nine species of game birds occur within the project area (Table 1; Dalton, 1990; D. Foster, pers. comm.). The chukar or chukar partridge is a well-established permanent resident in the state. The chukar is less dependent upon agricultural lands than other upland game birds and has adapted well to native habitats (Hayward et al., 1976). Foothills regions within the project area contain potential habitat for chukar partridge, and individuals may occasionally drift down into lower areas.

Blue grouse are common permanent residents in Utah that range from foothill elevations to timberline. The species is most characteristic of coniferous forests, however, and forages on a variety of berries. Nesting generally begins in mid-May (Hayward et al., 1976). Blue grouse are known to frequent woodland-shrub communities within the project area and are categorized as permanent residents (Dalton, 1990; Dames and Moore, 1990).

Ruffed grouse are also categorized as common permanent residents in Utah that occur in a wide range of habitats. Generally, ruffed grouse prefer brushy canyons and aspen forests with frequent open areas and nearby streams (Hayward et al., 1976).

Sage grouse are also categorized as permanent residents in Utah that occur in sagebrush or mixed grasslands with sagebrush grouse (Hayward et al., 1976). The species is restricted primarily to rangelands, and range restriction within Utah has resulted primarily from the eradication of sagebrush for agricultural purposes (Behle et al., 1985).

The mourning dove is a common summer resident and breeding bird throughout Utah. General dates of occurrence are early May to early September (Behle and Perry, 1975), and preferred nesting habitat includes riparian zones where nests are placed in small trees (Hayward et al., 1976). Potential nesting habitat for mourning doves likely occurs within the project area along springs and creeks.

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