CHAPTER IX

Vegetation Resources

PART 9.3 Existing Resources

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PART 9.4 Threatened and Endangered Species

See page seven of Vegetation and Terrestrial Wildlife Report, included with this Chapter as Item IX-1.

PART 9.5 Effects of Mining Operations on Vegetation

Vegetation will be removed in the surface disturbed area, after the initial construction phase mining operations should have no effect on the adjacent vegetation.

PART 9.6 Mitigation and Management Plans

All disturbed land, except water areas and surface areas of roads that are an approved part of the mining operation shall be seeded or planted to achieve a permanent vegetative cover. Entire area regraded and reseeded upon cessation of mining operation.

PART 9.7 Revegetation Methods and Justifications

PART 9.8 Revegetation Monitoring

Sucess of revegetation shall be monitored by techinques approved by the Division after consultation with appropriate State and Federal agencies. Comparison of ground cover and productivity may be made on the basis of reference areas or through the use of technical guidance procedures published by U.S.D.A. or

PART 9.8 Continued-

U.S.D.I. for assessing groung cover and productivity.

PART 9.9 Bibliography

NONE

ITEM IX-1

VEGETATION

AND

TERRESTRIAL WILDLIFE

REPORT

GENWAL COAL CO. LEASE SITE

CRANDALL CANYON

EMERY CO., UTAH

NOVEMBER 1980

PREPARED BY

ENVIRONMENTAL DEPT.

VALLEY ENGINEERING, INC.

RICHFIELD, UTAH

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VEGETATION

The purpose of the vegetation study hereunder reported is to approximate and describe vegetative communities prior to mining, to aid in the prediction of revegetation potential for the site, and identify important wildlife habitats in the mine plan area.

SITE DESCRIPTION

The proposed Genwal Mine site lies in Crandall Canyon, 1.9 kilometers upstream from Huntington Creek, on the north slope approximately 40 meters above Crandall Creek. Crandall Canyon is a westward trending side branch of Huntington Canyon roughly 6.1 kilometers in length. The creek forks 3.8 kilometers above its confluence with Huntington Creek. The right-hand fork bears nearly west while the left-hand fork bears southwest. Both forks are roughly 2.3 kilometers in length heading on eastern slopes of East Mountain. East Mountain is a north-south trending ridge which separates the headwaters of Crandall, Blind, Mill Fork, Rilda, Meetinghouse and Deer Creek Canyons from Upper Joes Valley and Cottonwood Canyon. In the vicinity of Crandall Canyon East Mountain averages 3230 meters (10,600 feet) elevation.

Crandall Canyon is a narrow, deep, V-shaped mountain valley 1500 to 2500 feet deep with extremely steep side slopes averaging nearly 70%. In its lower 2 kilometers Crandall Creek falls at an average rate of 53 meters per kilometer, running over exposed bedrock (Star Point Sandstone) a good portion of the way.

There are 10 vegetative communities in Crandall Canyon: (1) Cottonwood; (2) Sagebrush; (3) Mountain Grassland; (4) Mountain Shrub/Grassland; (5) Mixed Mountain Shrub/Conifer/Aspen; (6) Aspen; (7) Spruce/Fir/Aspen; (8) Spruce/Fir; (9) Alpine Grassland; (10) Riparian. Of the 10 communities, 6 lie within areas to be disturbed and/or impacted by the development and operation of the proposed Genwal Mine Site (numbers 1, 2, 4, 5, 7, and 10). Mountain Grassland (3) and Aspen (5) are found on the north-facing south slope and higher up on the north slope, outside of areas to be disturbed. Spruce/Fir (9) is also found on the north slope and Spruce/Fir (8) and Alpine Grassland (9) are found on the highest summits and ridges. In addition to the 10 naturally occuring vegetative communities the previously disturbed areas around the existing mine portals exhibit a vegetation association all their own.

VEGETATIVE COMMUNITIES FALLING WITHIN AREAS TO BE DISTURBED

Portions of 7 communities will be disturbed by mine site construction and road building. They are: Cottonwood; Sagebrush; Mountain Shrub/Grassland; Mixed Mountain Shrub/Conifer/Aspen; Spruce/Fir/Aspen; Reparian; and previously disturbed.

Representative areas of each community, other than Riparian, were sampled by means of three randomly placed 30 meter transects. Ten 1-square meter plots were randomly selected by lot in each of the 3 transects and sampled for cover and productivity. The Riparian community

was sampled in two locations by means of 10 transects, 10 meters or more long placed at right angles to the thread of the stream and spaced from 1 to 10 meters apart (spacing randomly selected by lot). Each of the 20 transects was sampled by 2 dm x 1 meter plots spaced at 1 meter intervals for 5 meters or more (as needed to reach limits of Riparian community) on either side of the centerline of the stream. The Riparian transects were likewise sampled for cover and productivity.

The seven communities sampled are summarized tabularly in Tables 3-A through 3-H. A complete species list is provided in Table 1 and a Community/Species list is provided in Table 2. Each of the communities is roughly described by visual dominants below.

PREVIOUSLY DISTURBED AREAS

The Previously Disturbed Areas around the existing mine portals were probably Spruce/Fir/Aspen and Mixed Mountain Shrub/Conifer/Aspen before 1939 when mining was just undertaken. Since mining stopped around 1955 three shrubs have taken over; Mountain Snowberry (*Symphoricarpos oreophilus*), Rubber Rabbitbrush (*Chrysothamnus nauseosus*), and Big Sagebrush (*Artemisia tridentata*)

COTTONWOOD

Along the lower 200 meters of Crandall Creek and along the bottomlands of Huntington Creek and one short section of Crandall Creek near the portals, the vegetative community is dominated by Narrowleaf Cottonwood (*Populus augustifolia*) and Rocky Mtn. Juniper (*Juniperus scopulorum*) in

the upper story and by Wood's Rose (Rosa woodsii), Big Sage (Artemisia tridentata), Squaw Currant (Ribes cereum) and Rocky Mountain Juniper (Juniperus scopulorum) in the understory.

SAGEBRUSH

The several small sagebrush flats occuring in the canyon are dominated by Big Sage (Artemisia tridentata).

MOUNTAIN SHRUB/GRASSLAND

This association, found on the south-facing slopes above Crandall Creek, is dominated by Curl-leaf Mahogany (Cercocarpus ledifolius), Rocky Mountain Juniper (Juniperus scopolorum), and Bluebunch Wheatgrass (Agropyron spicatum).

MIXED MOUNTAIN SHRUB/CONIFER/ASPEN

This association is found primarily near the toe of the south-facing north slope of the canyon. It is essentially a blending of the Mountain Shrub/Grassland and Spruce/Fir/Aspen communities. It is dominated in the upper story by the conifers Blue Spruce (Picea pungens), Douglas Fir (Psuedotsuga menziesii) and Ponderosa Pine (Pinus ponderosa), and by Aspen (Populus tremuloides), Curl-leaf Mahogany (Cercocarpus ledifolius)and Rocky Mountain Juniper (Juniperus scopulorum). The understory is dominated by Mountain Snowberry (Symphoricarpos oreophilus),

Rubber Rabbitbrush (Chrysothamnus nauseosus), Needle and Thread Grass Stipa comata), and Bluebunch Wheatgrass (Agropyron spicatum).

SPRUCE/FIR/ASPEN

This community is found in the bottomlands and north-facing south slope of Crandall Canyon. The upper story is dominated by Blue Spruce (Picea pungens), Douglas Fir (Psuedotsuga menziesii) and Aspen (Populus tremuloides). The understory is dominated by Mountain Snowberry (Symphoricarpos oreophilus). The Spruce/Fir/Aspen community generally gives way very quickly to the Mountain Shrub/Grassland or Mixed Mountain Shrub/Conifer/Aspen associations at the toe of the north slope. Right along this juncture Common Juniper (Juniperus communis) dominates the understory along with Mountain Snowberry (Symphoricarpos oreophilus).

RIPARIAN

The riparian community was sampled in two locations because of differences in the substrate. Riparian # 1 is located about 1.0 km below the existing mine portals. Here Crandall Creek flows over bedrock (Star Point Sandstone). Reparian # 2 is located just 200 meters upstream from the existing mine portals. There the substrate is regolithic.

The riparian communities exhibit more variety than the other communities sampled. This generalization holds for grasses, herbs, and shrubs, but not for trees, which though bordering the reparian zone, seldom encroach.

The dominant shrubs of Riparian # 1 are Red Osier Dogwood (Cornus stolonifera), a Willow (Salix myrtillifolia), and Common Juniper (Juniperus communis), The cominant herbs are Thistle (Cirsium pulchellum), an Aster (Aster glaucodes), and Richardson's Geranium (Geranium richardsonii). The dominant grasses are Redtop (Agrostis stolonifera) and a Fescue (Festuca pratensis).

The dominant shrubs of Riparian # 2 are Wood's Rose (Rosa woodsii), a Willow (Salix myrtillifolia), and Mountain Snowberry (Symphoricarpos oreophilus). The dominant herbs are the same three as in Riparian # 1: Aster (Aster glaucodes), Richardson's Geranium (Geranium richardsonii), and Thistle (Cirsium pulchellum) plus Heartleaf Bittercress (Cardamine cordifolia). The dominant grasses are Smooth Brome (Bromus inermis), Redtop (Agostis stolonifera), and an unidentifiable grass. Also dominant in the grass and herb layer is Horsetail,(Equisetum arvense).

TREES

Trees in the Cottonwood, Mixed Mountain Shrub/Conifer/Aspen, Mountain Shrub/Grassland, and Spruce/Fir/Aspen communities were sampled by the Point-Centered Quarter Method with tree diameters taken at breast height. Twenty stations were randomly selected in each community. Data is reported as part of Tables 3-B, 3-D, 3-E, and 3-F.

GRAZING

Crandall Canyon is currently being used as summer range for cattle. Approximately two dozen cows and calfs were in the canyon during the summer of 1980.

ENDANGERED OR THREATENED SPECIES

No endangered or threatened plant species were encountered in the vegetation survey.

IDENTIFICATION

Plant species were identified from pressed specimens by Endangered Plant Studies, Inc., 129 North 1000 East, Orem, Utah 84057.

DISTURBED AREAS

At the time of preparation of this report, final plans showing the exact areas and limits of construction disturbance were unavailable. Consequently, a strip of land 75 meters wide north of and including the riparian community of Crandall Creek was designated as Area of Potential Disturbance and areas of the various communities are listed as percentages of the area of the strip. When plans become available, areas will be refigured as percentages of the area of actual disturbance and the data will be appended and made part of this report.

REFERENCE AREAS

The establishment of Vegetative Reference areas has been delayed until Spring 1981 because Mine Site Development Plans and Road Construction plans were unavailable during the 1980 season. Reference areas will be established as soon as practical in 1981 and discriptions and data from these areas will be appended and made part of this report.

TABLE 1

ALPHABETICAL SPECIES LIST

Scientific Name	Common Name
Abies concolor	White Fir
Acer sp	Maple
Achillea millefolium	Yarrow
Actaea rubra	Baneberry
Agropyron cristatum	Crested Wheatgrass
Agropyron inerme	Beardless Wheatgrass
Agropyron spicatum	Bluebunch Wheatgrass
Agropyron trachycaulum	Slender Wheatgrass
Agrostis exerata	Spike Redtop
Agrostis stolonifera	Redtop
Angelica pinnata	
Antennaria parvifolia	Pussytoes
Artemisia dracunculus	Wormwood
Artemisia frigida	Fringed Sagebrush
Artemisia ludoviciana	Sage
Artemisia tridentata	Big Sagebrush
Aster chilensis	Pacific Aster
Aster glaucodes	Aster
Berula erecta	Water Parsnip
Betula occidentalis	River Birch
Bromus carcinatus	Mountain Brome

TABLE 1
ALPHABETICAL SPECIES LIST
PAGE 2

Scientific Name	Common Name
Bromus ciliatus	Fringed Brome
Bromus inermis	Smooth Brome
Cardamine cordifolia	Heartleaf Bittercress
Carex aurea	Sedge
Carex microptera	Smallwing Sedge
Carex atrata	Sedge
Carex vallicola	Sedge
Castilleja linariaefolia	Wyoming Painted-cup
Castilleja miniata	Indian Paintbrush
Cercocarpus ledifolius	Curl-leaf Mahogany
Chaenactis douglasii	
Chenopodium chenopodioides	Goosefoot
Chenopodium leptophyllum	Goosefoot
Chrysothamnus nauseosus	Rubber Rabbitbrush
Chrysothamnus viscidiflorus	Low Rabbitbrush
Cirsium pulchellum	Thistle
Cornus stolonifera	Red Osier Dogwood
Cynoglossum officinale	Houndstongue
Dactylis glomerata	Orchard Grass
Descurainia Californica	California Tansy Mustard
Descurainia pinnata	Pinnate Tansy Mustard
Elymus glaucus	Blue Wildrye
Epilobium augustifolium	Fireweed

TABLE 1
ALPHABETICAL SPECIES LIST
PAGE 3

Scientific Name	Common Name
Epilobium brevistylum	Willowherb
Epilobium latifolium	Willowherb
Equisetum arvense	Horsetail
Erigeron eatonii	Fleabane
Erigeron sp	Fleabane
Erysimum asperum	Wallflower
Festuca ovina	Blue Fescue
Festuca pratensis	Fescue Grass
Frageria americana	Wild Strawberry
Galium bifolium	Bedstraw
Gayophytum ramosissimum	
Gentianella amarella	
Geranium fremontii	Fremont Geranium
Geranium richardsonii	Richardson Geranium
Gilia aggregata	Skyrocket gilia
Hackelia floribunda	Showy stickseed
Heliomeris multiflora	
Hordeum jubatum	Foxtail Barley
Holodiscus dumosus	Rock Spirea
Hymenoxys acaulis	Hymenoxys
Hymenoxys richardsonii	Richardsons Hymenoxys
Juncus articus	Arctic Rush
Juncus ensifolius	Swordleaf Rush

TABLE 1
ALPHABETICAL SPECIES LIST
PAGE 4

Scientific Name	Common Name
Juniperus communis	Common Juniper
Juniperus scopulorum	Rocky Mountain Juniper
Lactuca scariola	Prickly Lettuce
Lappula occidentalis	Western Waterleaf
Lonicera involucrata	Bearberry Honeysuckle
Lonicera utahensis	Utah Honeysuckle
Machaeranthera canescens	Hoary Aster
Mahonia repens	Oregon Grape
Melica bulbosa	Oriongrass
Muhlenbergia filiformis	Pullup Muhly
Opuntia sp.	Prickly Pear
Oryzopsis hymenoides	Indian Ricegrass
Pachystima myrsinites	Mountain Lover
Penstemon caespitosus	Beardtongue
Penstemon eatonii	Beardtongue
Penstemon sp.	Beardtongue
Penstemon watsonii	Watson Beardtongue
Picea pungens	Blue Spruce
Pinus edulis	Pinyon Pine
Pinus ponderosa	Ponderosa Pine
Poa compressa	Canadian Bluegrass
Poa glauca	Bluegrass
Poa palustris	Fowl Bluegrass

TABLE 1
ALPHABETICAL SPECIES LIST
PAGE 5

Scientific Name	Common Name
Populus augustifolia	Narrowleaf Cottonwood
Populus tremuloides	Aspen
Prunus virginiana melanocarpa	Chokecherry
Psuedotsuga menziesii	Douglas Fir
Puccinellia nuttaliana	Alkaligrass
Ranunculus cymbalaria	Buttercup
Ribes cereum	Squaw Currant
Ribes sp.	Currant
Rosà woodsii	Woods Rose
Rubus idaeus	Red Raspberry
Rudbeckia occidentalis	Western Coneflower
Salix bebbiana	Beak Willow
Salix drummondiana	Willow
Salix myrtillifolia	Willow
Sambucus coerulea	Blue Elderberry
Sambucus racemosa	Red Elderberry
Senecio multilobatus	Groundsel
Senecio streptanthifolius	Groundsel
Shepherdia canadensis	Russet Buffaloberry
Silene menziesii	Menzies Silene
Smilacina stellata	False Solomonsseal
Solidago sparsiflora	Goldenrod

TABLE 1
ALPHABETICAL SPECIES LIST
PAGE 6

Scientific Name	Common Name
Stipa columbiana	Subalpine needlegrass
Stipa comata	Needle and Thread Grass
Stipa lettermanii	Letterman Needlegrass
Swertia radiata	Green Gentian
Symphoricarpos oreophilus	Mountain Snowberry
Thalictrum fendleri	Fendler Meadowrue
Tragopogon porrifolius	Salsify
Trisetum spicatum	Spike Trisetum
Urtica breweri	Stinging Nettle
Verbascum thapsus	Flannel Mullein
Vicia americana	American Vetch
Xanthocephalum sarothrae	

TABLE 2

SPECIES LIST BY PLANT GROUPING AND COMMUNITY TYPES:

Previously Distrubed (D), Cottonwood (CW), Sagebrush (SG), Mountain Shrub/Grassland (MSG), Mixed Mountain Shrub/Conifer/Aspen (MSCA), Spruce/Fir/Aspen (SFA), Riparian (R1 and R2).

GRASSES, SEDGES, RUSHES AND HORSETAILS

	D	CW	SG	MSG	MSCA	SFA	R1	R2
Agropyron cristatum	X							X
Agropyron inerme	X							
Agropyron spicatum	X	X	X	X	X			
Agropyron trachycaulum		X	X			X		X
Agrostis exerata							X	
Agrostis stolonifera		X					X	X
Bromus carcinatus	X							
Bromus ciliatus		X				X	X	X
Bromus inermis	X						X	X
Carex aurea							X	
Carex mi roptera							X	
Carex atrata							X	
Carex vallicola	X							
Dactylis glomerata							X	X
Elymus glaucus							X	
Equisetum arvens e		X					X	X
Festuca ovina							X	
Festuca pratensis							X	
Hordeum jubatum							X	
Juncus arcticus							X	
Juncus ensifolius							X	X
Melica bulbosa					X			
Muhlenbergia filiformis			X					
Oryzopsis hymenoides				X	X			
Poa compressa		X	X	X	X	X	X	X
Poa glauca								X

TABLE 2
PAGE 2

GRASSES, SEDGES, RUSHES AND HORSETAILS

	D	CW	SG	MSG	MSCA	SFA	R1	R2
Poa palustris	X	X	X			X		
Puccinellia nuttaliana							X	
Stipa columbiana	X					X		X
Stipa comata			X		X			
Stipa lettermanii	X		X	X		X		
Trisetum spicatum							X	X
Vegetative Grass							X	X

HERBS AND FORBS

Achillea millefolium	X	X	X			X	X	X
Angelica pinnata								X
Antennaria parvifolia		X	X		X			
Artemisia dracunculus			X					
Artemisia frigida		X	X	X				
Artemisia ludoviciana							X	X
Aster chilensis		X	X			X		X
Aster glaucodes		X		X		X	X	X
Berula erecta							X	
Cardamine cordifolia								X
Castilleja linariaefolia							X	
Castilleja miniata								X
Chaenactis douglasii	X				X	X		
Chenopodium chenopodioides	X					X		
Chenopodium leptophyllum	X				X		X	
Chrysothamnus viscidiflorus			X		X			
Cirsium pulchellum	X	X	X	X	X	X	X	X
Cynoglossum officinale	X	X	X			X		X
Descurainia californica						X		
Descurainia pinnata			X					
Epilobium augustifolium							X	
Epilobium brevistylum							X	X
Epilobium latifolium							X	X
Erigeron eatonii							X	
Erigeron sp.							X	

HERBS AND FORBS

	D	CW	SG	MSG	MSCA	SFA	R1	R2
Erysimum asperum						X		
Frageria americana						X		
Galium bifolium	X					X		
Gayophytum ramosissimum			X					
Gentianella amarella								X
Geranium fremontii	X		X			X	X	
Geranium richardsonii							X	X
Gilia aggregata	X		X		X			
Hackelia floribunda	X		X			X		X
Heliomeris multiflora								X
Hymenoxys acaulis		X						
Hymenoxys richardsonii			X					
Lactuca scariola							X	X
Lappula occidentalis	X		X			X		
Machaeranthera canescens		X	X	X	X	X		X
Opuntia sp.		X						
Penstemon caespitosus					X			
Penstemon eatonii							X	
Penstemon sp.		X						
Penstemon watsonii	X	X	X		X	X		
Ranunculus cymbalaria							X	X
Rudbeckia occidentalis								X
Senecio multilobatus						X		
Senecio streptanthifolius	X					X	X	X
Silene menziesii			X			X		
Smilacina stellata					X	X		
Solidago sparsiflora			X		X	X	X	X
Swertia radiata	X							
Thalictrum fendleri							X	X
Trogopogon porrifolius								X
Urtica breweri	X							
Verbascum thapsus	X							
Vicia americana	X		X	X				X
Xanthocephalum sarothrae					X			

SHRUBS

	D	CW	SG	MSG	MSCA	SFA	R1	R2
Actaea rubra								X
Artemisia tridentata	X	X	X	X	X	X	X	
Chrysothamnus nauseosus	X	X	X	X	X			
Cornus stolonifera							X	X
Holodiscus dumosus		X		X				
Juniperus communis						X	X	
Lonicera involucrata							X	X
Lonicera utahensis								X
Mahonia repens				X	X	X		
Pachystima myrsinites		X		X		X	X	X
Prunus virginiana					X			X
Ribes cereum		X				X	X	
Ribes sp.						X		X
Rosa woodsii	X	X	X	X	X	X	X	X
Rubus idaeus						X		X
Salix bebbiana							X	
Salix drummondiana							X	
Salix myrtillifolia							X	X
Sambucus coerula	X							
Sambucus racemosa			X					
Shepherdia canadensis							X	X
Symphoricarpos oreophilus	X	X	X	X	X	X	X	X

TREES

Abies concolor								X
Acer sp.						X		
Betula occidentalis		X						
Cercocarpus ledifolius		X			X			
Juniperus scopulorum	X			X	X			
Picea pungens					X	X	X	X
Pinus edulis								
Pinus ponderosa								
Populus augustifolia		X						
Populus tremuloides	X	X	X			X		X
Psuedotsuga menziesii					X	X		

TABLE 3-A

PREVIOUSLY DISTURBED AREA

(Transects 1-3)

	% FREQ	% COVER	% COMP	PROD* Kg/Ha	% PROD
GRASSES AND SEDGES					
Agropyron cristatum	NC	--	--	--	--
Agropyron inerme	23	T	T	8.7	0.3
Agropyron spicatum	30	0.4	0.8	29.7	0.9
Bromus carinatus	7	T	T	5.3	0.2
Bromus inermis	17	0.9	1.8	16.0	0.5
Carex vallicola	3	T	T	0.3	T
Poa palustris	43	1.9	3.8	40.0	1.2
Stipa columbiana	3	T	T	2.3	0.1
Stipa lettermanii	20	T	T	8.0	0.2
TOTAL GRASSES AND SEDGES		3.2	6.4	110.3	3.2
HERBS AND FORBS					
Achillea millefolium	10	0.1	0.2	2.3	0.1
Chaenactis donglasii	3	T	T	0.7	T
Chenopodium chenopodioides	7	0.1	0.2	2.7	0.1
Chenopodium leptophyllum	3	T	T	0.7	T
Cirsium pulchellum	10	2.0	4.0	58.0	1.7
Cynoglossum officinale	37	1.1	2.2	58.3	1.7
Galium bifolium	3	T	T	0.7	T
Geranium fremontii	3	T	T	0.3	T
Gilia aggregata	3	T	T	0.3	T
Hackelia floribunda	53	1.9	3.8	86.3	2.5
Lappula occidentalis	17	T	T	3.3	0.1
Penstemon watsonii	10	0.7	1.4	13.0	0.4
Senecio streptanthifolius	3	T	T	0.3	T
Swertia radiata	NC	--	--	--	--
Urtica breweri	3	T	T	0.3	T
Verbascum thapsus	3	0.3	0.6	4.7	0.1

* Productivity is reported as dry weight in kilograms per hectare.

TABLE 3-A
Page 2

	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
HERBS AND FORBS (cont.)					
Vicia americana	3	T	T	0.3	T
Total herbs and forbs		6.2	12.3	232.2	6.8
SHRUBS					
Artemisia tridentata	37	8.3	16.5	1177.0	34.7
Chrysothamnus nauseosus	43	12.7	25.2	1020.7	30.1
Rosa woodsii	33	2.1	4.2	83.7	2.5
Symphoricarpos oreophilus	37	17.7	35.2	762.3	22.5
Total shrubs		40.8	81.1	3043.7	89.7
TREE SEEDLINGS					
Juniperus scopulorum	3	T	T	4.0	0.1
Populus tremuloides	3	0.1	0.2	4.0	0.1
Total tree seedlings		0.1	0.2	8.0	0.2
Total for community		50.3	100.0	3394.2	99.9

TABLE 3-B

COTTONWOOD

(Transects 13-15)

	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
GRASSES AND HORSETAILS					
Agropyron spicatum	3	T	T	T	T
Agropyron trachycaulum	13	0.1	0.3	1.3	0.1
Agrostis stolonifera	NC	--	--	--	--
Bromus ciliatus	20	0.1	0.3	2.0	0.1
Equisetum arvense	3	T	T	T	T
Poa compressa	47	0.5	1.5	14.3	0.7
Poa palustris	20	0.2	0.6	7.0	0.3
Total Grasses		0.9	2.7	24.9	1.2
HERBS AND FORBS					
Achillea millefolium	7	T	T	0.7	T
Antennaria parvifolia	3	0.1	0.3	1.0	T
Artemisia frigida	10	0.1	0.3	1.7	0.1
Aster chilensis	13	0.2	0.6	3.3	0.2
Aster glaucodes	27	0.6	1.9	5.7	0.3
Cirsium pulchellum	23	0.9	2.8	14.7	0.7
Cynoglossum officinale	7	0.1	0.3	1.3	0.1
Hymenoxys acaulis	3	T	T	1.0	T
Machaeranthera canescens	20	0.1	0.3	2.7	0.1
Penstemon sp.	3	T	T	T	T
Penstemon watsonii	3	T	T	T	T
Opuntia sp.	NC	--	--	--	--
Total herbs and forbs		2.1	6.5	32.1	1.5
SHRUBS					
Artemisia tridentata	47	7.7	23.8	791.3	39.1
Chrysothamnus nauseosus	13	1.4	4.3	76.7	3.8
Holodiscus dumosus	7	1.4	4.3	95.7	4.7
Pachystima myrsinites	3	T	T	T	T

TABLE 3-B
Page 2

SHRUBS (cont.)	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Ribes cereum	17	4.4	13.6	281.0	13.9
Rosa woodsii	53	9.5	29.4	362.7	17.9
Symphoricarpos orephilus	27	2.1	6.5	60.7	3.0
Total Shrubs		26.5	81.9	1668.1	82.4
TREE SEEDLINGS					
Betula occidentalis	3	T	T	T	T
Cercocarpus ledifolius	10	1.8	5.6	254.7	12.6
Populus augustifolia	7	0.2	0.6	8.3	0.4
Populus tremuloides	17	0.8	2.5	35.0	1.7
Total tree seedling		2.8	8.7	298.0	14.7
Total Community		32.3	99.8	2023.1	99.8

TREES

Method = Point-centered Quarter

# of sample points = 23 (throughout area at mouth of canyon)

Average dist. = 4.89 m.

Mean area = 23.91 sq m. / tree = 418 trees per hectare.

Species List	#	% FREQ	DENSITY (trees/Ha)
Narrowleaf Cottonwood (Populus augustifolia)	57	62	259
Rocky Mountain Juniper (Juniperus scopulorum)	14	15	63
Blue Spruce (Picea pungens)	8	9	38
River Birch (Betula occidentalis)	7	8	33
Maple (Acer sp.)	2	2	8
Aspen (Populus tremuloides)	1	1	4
White Fir (Abies concolor)	1	1	4
Curl-leaf Mahogany (Cercocarpus ledifolius)	1	1	4
Douglas Fir (Pseudotsuga menziesii)	1	1	4
	92	100	417

TABLE 3-B
Page 3

Tree Diameters, Basal Areas

	1-10 Cm	11-25 Cm	26-50 Cm	Over 50 Cm	Ave. dia.	Basal area Sq m per hectare
Populus augustifolia	24	20	13	0	16.4	5.47
Juniperus scopulorum	11	3	0	0	8.1	0.32
Picea pungens	3	2	3	0	18.8	1.05
Betula occidentalis	7	0	0	0	4.9	0.06
Acer sp.	2	0	0	0	5.5	0.02
Populus tremuloides	1	0	0	0	5.0	0.01
Abies concolor	1	0	0	0	5.0	0.01
Cercocarpus ledifolius	1	0	0	0	3.0	0.003
Psuedotsuga menziesii	0	0	1	0	31.0	0.32
	50	25	17	0		7.26

TABLE 3-C

SAGEBRUSH

(Transects 10-12)

GRASSES	% FREQ	% COVER	% COMP	PROD Kg/ha	% PROD
Agropyron spicatum	33	0.4	0.8	9.7	0.4
Agropyron trachycaulum	13	0.1	0.2	4.7	0.2
Muhlenbergia filiformis	10	0.1	0.2	2.0	0.1
Pon compressa	13	0.4	0.8	5.3	0.2
Pon palustris	27	0.7	1.4	15.7	0.6
Stipa comata	83	7.1	14.3	125.3	4.8
Stipa lettermanii	20	0.5	1.0	16.0	0.6
TOTAL GRASSES		9.3	18.7	178.7	6.9
HERBS AND FORBS					
Achillea millefolium	7	0.1	0.2	2.0	0.1
Antennaria parvifolia	13	0.6	1.2	4.0	0.2
Artemisia dracunculus	17	1.4	2.8	95.0	3.6
Artemisia frigida	3	0.1	0.2	1.3	T
Aster chilensis	3	T	T	0.3	T
Chrysothamnus viscidiflorus	23	2.0	4.0	34.3	1.3
Cirsium pulchellum	3	0.1	0.2	0.7	T
Cynoglossum officinale	10	0.4	0.8	8.3	0.3
Descurainia pinnata	3	T	T	0.3	T
Gayophytum ramosissimum	17	T	T	1.7	0.1
Geranium fremontii	7	T	T	2.7	0.1
Gilia aggregata	23	0.3	0.6	7.7	0.3
Hackelia floribunda	7	0.1	0.2	2.7	0.1
Hymenoxys richardsonii	NC	--	--	--	--
Lappula occidentalis	27	0.2	0.4	7.0	0.3
Machaeranthera canescens	13	0.1	0.2	2.3	0.1
Penstemon watsonii	50	1.9	3.8	32.7	1.3
Silene menziesii	13	0.2	0.4	1.3	T

TABLE 3-C
Page 2

HERBS AND FORBS (cont.)	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Solidago sparsiflora	13	0.3	0.6	4.3	0.2
Vicia americana	3	T	T	0.3	T
TOTAL HERBS AND FORBS		7.8	15.6	208.9	8.0
SHRUBS					
Artemisia tridentata	83	22.1	44.6	1667.0	63.8
Chrysothamnus nauseosus	50	7.3	14.7	402.7	15.4
Rosa woodsii	27	0.6	1.2	4.0	0.2
Sambucus racemosa	3	0.1	0.2	4.3	0.2
Symphoricarpos oreophilus	7	2.0	4.0	139.7	5.3
TOTAL SHRUBS		32.1	64.7	2217.7	84.9
TREE SEEDLINGS					
Populus tremuloides	7	0.4	0.8	6.7	0.3
TOTAL TREE SEEDLINGS		0.4	0.8	6.7	0.3
TOTAL COMMUNITY		49.6	99.8	2612.0	100.1

TABLE 3-D

MOUNTAIN SHRUB/GRASSLAND

(Transects 4-6)

	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
GRASSES					
Agropyron spicatum	90	19.3	83.5	556.7	65.8
Poa compressa	17	0.2	0.9	12.3	1.5
Stipa lettermanii	10	1.0	4.3	6.7	0.8
TOTAL GRASSES		20.5	88.7	575.7	68.0
HERBS AND FORBS					
Artemisia frigida	3	0.1	0.4	12.0	1.4
Aster glaucodes	13	0.4	1.7	3.3	0.4
Cirsium pulchellum	10	0.1	0.4	2.7	0.3
TOTAL HERBS AND FORBS		0.6	2.5	18.0	2.1
SHRUBS					
Artemisia tridentata	10	1.7	7.4	240.3	28.4
Holodiscus dumosus	NC	--	--	--	--
Mahonia repens	17	0.1	0.4	3.3	0.4
Pachystima myrsinites	3	T	T	0.7	0.1
Rosa woodsii	7	0.1	0.4	2.0	0.2
Sumphoricarpos oreophilus	3	0.1	0.4	6.0	0.7
TOTAL SHRUBS		2.0	8.6	252.3	29.8
TOTAL COMMUNITY		23.1	99.8	846.0	99.9

TREES

Method: Point - centered Quarter

# of sample points = 20 (taken in area above & to the west of existing portals)

Average dist. = 4.31 m.

Mean area = 18.58 sq m / tree = 538 trees / hectare.

TABLE 3-D
Page 2

Species List	% FREQ	DENSITY (trees/Ha)
Rocky Mountain Juniper (Juniperus scopulorum)	31	167
Curl-leaf Mahogany (Cercocarpus ledifolius)	55	296
Douglas Fir (Pseudotsuga menziesii)	9	48
Pinion Pine (Pinus edulis)	5	27
	100	538

Tree Diameters, Basal Areas

	1-10 Cm	11-25 Cm	26-50 Cm	50-100 Cm	Ave. dia.	Basal area Sq m per hectare
Cerocarpus ledifolius	19	25	0	0	11.7	3.18
Juniperus scopulorum	15	10	0	0	10.4	1.41
Psuedotsuga menziesii	3	2	2	0	18.1	1.25
Pinus edulis	0	1	2	1	38.0	3.05
	37	38	4	1		8.89

TABLE 3-E

MIXED MOUNTAIN SHRUB/CONIFER/ASPEN

(Transects 16-18)

GRASSES	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Agropyron spicatum	57	2.1	6.1	25.3	3.8
Melica bulbosa	27	1.6	4.7	16.3	2.4
Oryzopsis hymenoides	13	0.6	1.8	7.3	1.1
Poa compressa	37	1.0	2.9	12.3	1.8
Stipa comata	50	3.1	9.1	32.0	4.8
TOTAL GRASSES		8.4	24.6	93.2	13.9
HERBS AND FORBS					
Antennaria parvifolia	40	1.2	3.5	8.7	1.3
Chaenactis douglasii	3	T	T	T	T
Chenopodium leptophyllum	3	T	T	T	T
Chrysothamnus viscidiflorus	7	0.7	2.0	6.3	0.9
Cirsium pulchellum	17	1.8	5.3	3.3	0.5
Gilia aggregata	7	0.2	0.6	2.0	0.3
Machaeranthera canescens	10	0.5	1.5	2.7	0.4
Penstemon caespitosus	3	0.3	0.9	0.7	0.1
Penstemon watsonii	27	0.8	2.3	7.3	1.1
Smilacina stellata	13	0.5	1.5	2.7	0.4
Solidago sparsiflora	30	1.2	3.5	7.0	1.0
Xanthocephalum sarothrae	10	T	T	T	T
TOTAL HERBS AND FORBS		7.2	21.1	40.7	6.0
SHRUBS					
Artemisia tridentata	37	2.0	5.8	112.3	16.8
Chrysothamnus nauseosus	20	4.4	12.9	114.3	17.1
Mahonia repens	10	0.5	1.5	2.7	0.4
Prunus virginiana	NC	--	--	--	--
Rosa woodsii	10	0.4	1.2	1.0	0.1
Symphoricarpos oreophilus	30	6.2	18.1	151.3	22.6
TOTAL SHRUBS		13.5	39.5	381.6	57.0

TREE SEEDLINGS	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Cercocarpus ledifolius	40	5.0	14.6	150.0	22.4
Juniperus scopulorum	3	0.1	0.3	3.0	0.4
TOTAL TREE SEEDLINGS		5.1	14.9	153.0	22.8
TOTAL COMMUNITY		34.2	100.1	668.5	99.7

TREES

Method: Point - centered Quarter

# of samples = 20

Average dist. = 4.16 m.

Mean area = 17.31 sq m / tree = 578 trees / hectare.

Species List	#	% FREQ	DENSITY (trees/Ha)
Aspen (Populus tremuloides)	23	29	168
Rocky Mountain Juniper (Juniperus scopulorum)	30	37	214
Ponderosa Pine (Pinus ponderosa)	10	12	69
Curl-leaf Mahogany (Cerocarpus ledifolius)	7	9	52
Blue Spruce (Picea pungens)	2	3	17
White Fir (Abies concolor)	1	1	6
Douglas Fir (Psuedotsuga menziesii)	6	8	46
Choke Cherry (Prunus virginiana)	1	1	6
	80	100	578

Tree Diameters, Basal Areas

	1-10 Cm	11-25 Cm	26-50 Cm	51-100 Cm	Ave. dia. (Cm)	Basal area Sq m per hectare
Populus tremuloides	16	7	0	0	8.7	1.00
Juniperus scopulorum	15	14	1	0	11.3	2.14
Pinus ponderosa	1	1	5	3	45.5	11.33

Tree Diameters, Basal Areas (continued)

	1-10 Cm	11-25 Cm	26-50 Cm	51-100 Cm	Ave. dia. (Cm)	Basal area Sq m per hectare
Cercocarpus ledifolius	3	4	0	0	11.3	0.52
Picea pungens	1	1	0	0	12.0	0.20
Abies concolor	0	0	1	0	29.0	0.38
Psuedotsuga menziesii	1	2	3	0	27.0	2.64
Prunus virginiana	1	0	0	0	3.0	0.004
	38	29	10	3		18.21

TABLE 3-F

SPRUCE/FIR/ASPEN

(Transects 7-9)

GRASSES	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Agropyron trachycaulum	27	0.3	0.7	11.0	0.6
Bromus ciliatus	23	0.5	1.1	6.7	0.3
Poa compressa	17	0.3	0.7	5.7	0.3
Poa palustris	67	2.2	4.9	44.0	2.3
Stipa columbiana	3	T	T	0.3	T
Stipa lettermanii	27	0.2	0.4	8.0	0.4
TOTAL GRASSES		3.5	7.7	75.7	3.9

HERBS AND FORBS					
Achillea millefolium	37	0.1	0.2	8.0	0.4
Aster chilensis	3	T	T	0.7	T
Chaenactis douglasii	7	T	T	2.0	0.1
Chenopodium chenopodioides	3	T	T	0.3	T
Cirsium pulchellum	17	1.3	2.9	9.7	0.5
Cynoglossum officinale	53	1.4	3.1	30.0	1.5
Descurainia californica	3	T	T	0.3	T
Erysimum asperum	NC	-	-	-	-
Frageria americana	10	0.4	0.9	3.3	0.2
Galium bifolium	30	0.4	0.9	5.7	0.3
Geranium fremontii	40	0.9	2.0	12.7	0.7
Hackelia floribunda	40	2.1	4.6	56.3	2.9
Lappula occidentalis	17	0.1	0.2	5.0	0.3
Machaeranthera canescens	30	0.5	1.1	9.0	0.5
Penstemon watsonii	17	0.4	0.9	10.3	0.5
Senecio multilobatus	NC	-	-	-	-
Senecio streptanthifolius	10	T	T	2.0	0.1
Silene menziesii	23	0.3	0.7	4.7	0.2

TABLE 3-F
Page 2

HERBS AND FORBS (cont)	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Smilacina stellata	7	0.2	0.4	2.0	0.1
Solidago sparsiflora	10	0.2	0.4	3.3	0.2
TOTAL HERBS AND FORBS		8.3	18.4	165.3	8.5
SHRUBS					
Artemisia tridentata	13	0.3	0.7	10.3	0.5
Juniperus communis	NC	--	--	--	--
Mahonia repens	3	0.3	0.7	2.0	0.1
Pachystima myrsinites	30	2.0	4.4	71.7	3.7
Ribes cereum	13	1.5	3.3	97.0	5.0
Ribes sp	3	0.6	1.3	27.3	1.4
Rosa woodsii	43	4.5	10.0	147.0	7.5
Rubus idaeus	3	0.3	0.7	6.0	0.3
Symphoricarpos oreophilus	80	22.4	49.6	1288.7	66.1
TOTAL SHRUBS		31.9	70.6	1650.0	84.6
TREE SEEDLINGS					
Acer sp	3	T	T	0.3	T
Populus tremuloides	33	1.5	3.3	58.7	3.0
TOTAL TREE SEEDLINGS		1.5	3.3	59.0	3.0
TOTAL COMMUNITY		45.2	100.0	1950.0	100.0

TREES

Method: Point - centered Quarter

# of sample = 20

Average dist. = 3.02 m.

Mean area = 9.12 sq m / tree = 1096 trees / Hectare

TABLE 3-F
Page 3

Species List	#	% FREQ	DENSITY (trees/Ha)
Blue Spruce (*Picea pungens*)	36	45	493
Douglas Fir (*Psuedotsuga menziesii*)	16	20	219
Aspen (*Populus tremuloides*)	21	26	285
Rocky Mountain Juniper (*Juniperus scopulorum*)	5	6	66
White Fir (*Abies concolor*)	2	3	33
	80	100	578

Tree Diameters, Basal Areas

	1-10 Cm	11-25 Cm	26-50 Cm	51-100 Cm	Ave. dia.	Basal area Sq m per hectare
Picea pungens	7	22	6	1	19.0	13.99
Psuedotsuga menziesii	4	8	4	0	19.1	6.28
Populus tremuloides	7	13	1	0	12.6	3.55
Juniperus scopulorum	3	2	0	0	9.4	0.46
Abies concolor	0	2	0	0	19.5	0.98
	21	47	11	1		25.26

TABLE 3-G

RIPARIAN #1

(Transect R-1)

GRASSES, SEDGES, RUSHES & HORSETAILS	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Agrostis exerata	1	T		T	
Agrostis stolonifera	17	1.4	8.1	46.7	3.4
Bromus ciliatus	7	0.1	0.6	7.5	0.6
Bromus inermis	1	T	T	0.4	T
Carex aurea	2	T	T	0.4	T
Carex microptera	2	T	T	1.7	0.1
Carex atrata	4	0.1	0.6	6.7	0.5
Dactylis glomerata	1	T	T	1.3	0.1
Elymus glaucus	1	T	T	1.3	0.1
Equisetum arvense	5	0.1	0.6	5.0	0.4
Festuca ovina	1	T	T	0.4	T
Festuca pratensis	3	0.6	3.5	12.5	0.9
Hordeum jubatum	1	T	T	1.3	0.1
Juncus arcticus	3	0.1	0.6	4.6	0.3
Juncus ensifolius	9	0.1	0.6	15.0	1.1
Poa compressa	7	0.2	1.2	12.5	0.9
Puccinellia nuttaliana	2	0.1	0.6	2.5	0.2
Trisetum spicatum	4	0.1	0.6	7.5	0.6
Vegetative grass	4	0.4	2.3	6.3	0.5
TOTAL GRASSES, SEDGES AND RUSHES		3.3	19.1	133.6	9.9

HERBS AND FORBS					
Achillea millefolium	20	0.2	1.2	12.1	0.9
Artemisia ludoviciana	2	T	T	3.8	0.3
Aster glaucodes	16	0.6	3.5	23.3	1.7
Berula erecta	8	T	T	4.2	0.3
Castilleja linariaefolia	1	T	T	0.4	T
Chenopodium leptophyllum	1	T	T	0.4	T
Cirsium pulchellum	10	1.6	9.2	12.9	1.0

TABLE 3-G
Page 2

HERBS AND FORBS (cont)	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Epilobium augustifolium	1	T	T	2.5	0.2
Epilobium brevistylum	10	0.2	1.2	5.4	0.4
Epilobium latifolium	1	0.1	0.6	2.9	0.2
Erigeron eatonii	1	T	T	0.4	T
Erigeron sp	1	T	T	0.4	T
Geranium fremontii	3	0.2	1.2	5.0	0.4
Geranium richardsonii	8	0.4	2.3	8.3	0.6
Lactuca scariola	10	T	T	4.6	0.3
Penstemon eatonii	1	T	T	1.3	0.1
Ranunculus cymbalaria	5	0.3	1.7	4.2	0.3
Senecio streptanthifolius	4	0.1	0.6	3.3	0.2
Solidago sparsiflora	10	0.1	0.6	7.5	0.6
Thalictrum fendleri	10	0.1	0.6	5.8	0.4
TOTAL HERBS AND FORBS		3.9	22.5	108.7	8.0
SHRUBS					
Artemisia tridentata	2	T	T	4.6	0.3
Cornus stolonifera	10	2.8	16.2	312.9	23.1
Juniperus communis	3	1.6	9.2	200.4	14.8
Lonicera involucrata	2	0.1	0.6	11.3	0.8
Pachystima myrsinites	2	0.2	1.2	9.6	0.7
Ribes cereum	3	1.3	7.5	109.6	8.1
Rosa woodsii	8	1.2	6.9	20.8	1.5
Salix bebbiana	1	T	T	2.1	0.2
Salix drummondiana	2	0.5	2.9	60.4	4.5
Salix myrtillifolio	17	1.8	10.4	251.3	18.5
Shepherdia canadensis	1	0.1	0.6	30.4	2.2
Symphoricarpos oreophilus	2	0.1	0.6	7.5	0.6
TOTAL SHRUBS		9.7	56.1	1020.9	75.3
TREE SEEDLINGS					
Picea pungens	4	0.4	2.3	92.1	6.8
TOTAL TREE SEEDLINGS		0.4	2.3	92.1	6.8
TOTAL COMMUNITY		17.3	100.0	1355.3	100.0

TABLE 3-H

RIPARIAN #2

(Transect R-2)

GRASSES, RUSHES AND HORSETAILS	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Agropyron cristatum	1	T	T	0.5	T
Agropyron trachycaulum	8	0.1	0.2	6.3	0.2
Agrostis stolonifera	10	0.7	1.5	30.6	0.9
Bromus ciliatus	5	T	T	2.3	0.1
Bromus inermis	18	2.2	4.8	77.5	2.2
Dactylis glomerata	1	T	T	2.7	0.1
Equisetum arvense	18	1.8	3.9	33.3	0.9
Juncus ensifolius	3	0.2	0.4	14.9	0.4
Poa compressa	2	T	T	1.8	0.1
Poa glauca	1	T	T	0.9	T
Stipa columbiana	1	T	T	0.5	T
Trisetum spicatum	1	T	T	0.5	T
Vegetative grass	21	0.9	2.0	31.1	0.9
TOTAL GRASSES, RUSHES AND HORSETAILS		5.9	12.8	202.9	5.8
HERBS AND FORBS					
Achillea millefolium	20	0.3	0.7	14.9	0.4
Angelica pinnata	3	0.2	0.4	5.9	0.2
Artemisia ludoviciana	7	0.2	0.4	52.3	1.5
Aster chilensis	1	T	T	0.9	T
Aster glaucodes	34	3.7	8.0	89.2	2.5
Cardamine cordifolia	6	0.6	1.3	12.2	0.3
Castilleja miniata	1	T	T	0.9	T
Cirsium pulchellum	3	0.6	1.3	32.0	0.9
Cynoglossum officinale	4	0.2	0.4	7.7	0.2
Epilobium brevistylum	2	T	T	1.4	T
Epilobium latifolium	4	0.2	0.4	4.5	0.1
Gentianella amarella	1	T	T	0.5	T

TABLE 3-H

Riparian #2
Page 2

HERBS AND FORBS (cont)	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Geranium richardsonii	31	2.2	4.8	47.7	1.4
Hackelia floribunda	1	T	T	1.4	T
Heliomeris multiflora	1	T	T	0.5	T
Lactuca scariola	4	T	T	1.8	0.1
Machaeranthera canescens	1	0.1	0.2	1.4	T
Ranunculus cymbalaria	1	T	T	0.5	T
Rudbeckia occidentalis	2	0.1	0.2	9.0	0.3
Senecio streptanthifolius	1	T	T	1.4	T
Solidago sparsiflora	10	0.1	0.2	5.9	0.2
Thalictrum fendleri	5	0.1	0.2	3.2	0.1
Trogopogon porrifolius	1	T	T	1.4	T
Vicia americana	7	0.1	0.2	4.1	0.1
Vegetative herb	6	0.3	0.7	5.4	0.2
TOTAL HERBS AND FORBS		9.0	19.6	306.1	8.7
SHRUBS					
Actaea rubra	1	0.3	0.7	16.2	0.5
Cornus stolonifera	5	0.4	0.9	36.9	1.0
Lonicera involucrata	1	0.2	0.4	16.2	0.5
Lonicera utahensis	1	T	T	2.3	0.1
Pachystima myrsinites	1	0.1	0.2	3.6	0.1
Prunus virginiana	1	0.1	0.2	4.1	0.1
Ribes sp.	3	0.4	0.9	32.4	0.9
Rosa woodsii	41	13.1	28.5	840.1	23.9
Rubus idaeus	5	0.3	0.7	28.4	0.8
Salix myrtillifolio	15	7.3	15.9	1190.1	33.8
Shepherdia canadensis	5	1.5	3.3	163.1	4.6
Symphoricarpos oreophilus	15	5.7	12.4	459.0	13.0
TOTAL SHRUBS		29.4	63.9	2792.4	79.3

TABLE 3-H

Riparian #2
Page 3

TREE SEEDLINGS	% FREQ	% COVER	% COMP	PROD Kg/Ha	% PROD
Abies concolor	3	0.1	0.2	12.2	0.3
Picea pungens	7	1.4	3.0	191.4	5.4
Populus tremuloides	2	0.2	0.4	16.2	0.5
TOTAL TREE SEEDLINGS		1.7	3.7	219.8	6.2
TOTAL COMMUNITY		46.0	100.0	3521.2	100.0

TABLE 4

Plant communities of the Genwal Coal Co. lease area by percent of area covered:

Type	Hectares	% area
Previously Disturbed	0.46	1.4
Mountain Shrub/Grassland	29.73	91.8
Mixed Mt. Shrub/Conifer/Aspen	0.98	3.0
Spruce/Fir/Aspen	1.21	3.8
	32.38 (80 acres)	100.0

Plant communities of area of Potential Disturbance by percent of area covered:

Type	Hectares	% area
Cottonwood	1.10	5.4
Sagebrush	0.87	4.2
Mountain Shrub/Grassland	7.43	36.1
Mixed Mt. Shrub/Conifer/Aspen	4.45	21.6
Spruce/Fir/Aspen	2.48	12.1
Spruce/Fir	0.10	0.5
Riparian	2.06	10.0
Previously Disturbed	1.61	7.8
Huntington Creek	0.48	2.3
	20.58	100.0

TERRESTRIAL WILDLIFE AND HABITAT

This report will deal with the subject of terrestrial wildlife and habitat in Crandall Canyon by addressing itself to seven topics or subjects. These topics are (1) Raptors; (2) Migratory Birds of High Federal Interest (3) Upland Game Birds (4) State protected species; (5) Federally Listed Threatened or Endangered Species; (6) Big Game; (7) All other vertebrates - amphibians, reptiles, birds, and mammals.

RAPTOR SURVEY

Crandall Canyon was first searched for Raptor presence and use on June 16 and 17, 1980. Other searches were conducted during July. In addition, some raptor activities were observed and sign discovered during other phases of the wildlife and vegetational surveys being done. The purpose of the survey was to determine use of the area by raptorial species.

The only active nesting observed was that of a pair of Golden Eagles (Aquila chrysaetos). Their nest is located in a cliffv outcrop along the summit of the ridge north of Crandall Creek, and about 0.8 km northeast of the existing mine portals. On the 17th of June a single juvenile eagle was observed to still be in the nest. At that time, a single mature and a single immature Golden Eatle were seen soaring above the ridge in the vicinity of the nest. Judging from the small size of the white spots under its wings the immature eagle was probably fledged in 1979. Later in June and on numerous occassions

during July as many as four eagles were seen soaring in the vicinity of the nest. The group consisted of the three eagles previously mentioned plus another adult. Only on one occasion were they ever seen to cross to the south side of Crandall Canyon during their flights. On several occasions during July an adult male Goshawk (Accipiter gentilis) was observed hunting in the area of the existing portals. One evening he tried to take a red squirrel within twenty feet of where one of our biologists was sitting in camp.

The remains of several small birds preyed upon by raptors were found in the Spruce-Fir-Aspen areas upstream from the existing portals, as well as a single occurance (the remains of a Stellers Jay (Cyanocitta stelleri)) in the shallow side cayon entering Crandall Creek from the north 0.2 km west of the existing portals. Nearby this occurance were hawk droppings. Also in this shallow side canyon were found two inactive Cooper's Hawk (Accipiter cooperii) nests. One at the mouth 30 meters north of the road 40 feet up in a Blue Spruce and another 200 meters north 25 to 30 feet up a 70 foot White Fir. This latter nest is several years old, evidenced by the fact that the bottom is beginning to fall out. The remains of the Stellers Jay were found 75 meters above this last nest.

On the south side of Crandall Canyon there are three shallow side canyons, more or less equally spaced. The highest is 200 meters west of the above mentioned side canyon on the north. Near its mouth was found a very old nest with the remains of a casting beneath

it. It was 15 feet up a 40 foot Blue Spruce and judging from its height and appearance, is possibly that of a Sharp-shinned Hawk (Accipiter striatus). About 300 meters up this same canyon were found three Great Horned Owl (Bubo virginianus) castings. They appeared to be quite old.

1.8 km west of the existing mine portals Crandall Canyon forks. The cliffs in the notch of the fork were visually searched for raptor nests but none were spotted. Both forks of Crandall Canyon were thoroughly searched for raptor sign and nests for a distance of 500 meters or more, but none were found.

The only raptor sign found below the existing mine portals was the dried pelt of a rabbit 20 feet up in a Douglas Fir. This pelt was found approximately 1 km below the portals.

In conclusion, except for the eagle nest high on the ridge north and east of the existing mine portal area, there is no active raptor nesting in Crandall Canyon. However, some parts of the canyon are being used as a hunting range for raptors.

MIGRATORY BIRDS OF HIGH FEDERAL INTEREST

The U.S. Fish and Wildlife Service has compiled a list of twenty-two species of migratory birds, which occur in the Uintah-Southwestern Utah Coal Production Region, for which there is high federal interest.

Eleven of the twenty-two are raptors:

(1) Bald Eagle (Haliaeetus leucocephalus): An endangered winter resident of Utah, usually near lakes, rivers and marshes surrounded by open country with suitable perching sites. Crandall Canyon, because of its narrowness and small creek, and Huntington Canyon, because of its narrowness and swift water, are not good Bald Eagle habitat.

(2) Golden Eagle (Aquila chrysaetos): A common resident of the mountains and deserts of Utah. An active nest was found high on the ridge 0.8 km northeast of the proposed mine site. Mine development and operation should have little or no affect on this nest.

(3) Peregrine Falcon (Falco peregrinus): An endangered resident of canyons, high cliffs, rivers, marshlands and deserts. There are no known sightings of Peregrine Falcons in Huntington Canyon. The nearest known sightings come from Manti, roughly 50 kilometers southwest and the San Raphaël River, roughly 6o kilometers southeast.

(4) Prairie Falcon (Falco mexicanus): A common resident of open habitat in canyons, mountains, plains, and deserts. Although none were seen, the Mountain Grassland found up on the north-facing south slope of Crandall Canyon could be suitable habitat of Prairie Falcons.

(5) Ferruginous Hawk (Buteo regalis): An uncommon summer resident and rare winter resident of open desert; infrequently seen in marshes and farmlands. Crandall and Huntington Canyon are not likely habitats for Ferruginous Hawk.

(6) Merlin (Falco columbarius) A common winter resident of open country and foothills which preys on flocks of perching birds. The Crandall Canyon area is not likely to attract Merlins.

(7) Cooper's Hawk (Accipiter cooperii): A common summer resident and transient and rare winter resident of broken woodlands, dry wooded canyons, riparian areas, pinion/juniper and conifer forests. An adult male Cooper's Hawk was seen in Huntington Canyon about 1 km north of Crandall Canyon on June 16, 1980. Also, two inactive nests were found in the shallow canyon west of the existing protals on the north slope of Crandall Canyon.

(8) Osprey (Pandion haliactus): An uncommon transient which frequents rivers, lakes and large bodies of water. The several large lakes higher up Huntington Canyon may attract Osprey, but Crandall Canyon and Lower Huntington Canyon would not be Osprey territory.

(9) Spotted Owl (Strix occidentalis): A little known dessert owl of wooded canyons with narrow side canyons. The Spotted Owl's published range does not overlap Huntington Canyon.

(10) Burrowing Owl (Speotyto cunicularia): A resident limited to open grasslands, usually prairies, deserts, and farmlands, but sometimes occuring at higher elevations. Although not seen in Crandall Canyon the Mountain Grassland community occuring up on the north-facing south slope could very well attract and support Burrowing Owls.

(11) Flammulated Owl (Otus flammeolus): A little known summer resident partial to open pine and fir forests in mountains. While not seen in Crandall Canyon, Flammulated Owl habitat abounds in Crandall Canyon.

The remaining eleven Migrating Bird species of High Federal Interest are discussed below:

(12) Pileated Woodpecker (Dryocopus pileatus): A rare resident of mature coniferous and mixed forests with many snags, but whose range does not include the Huntington Canyon area.

(13) Williamson's Sapsucker (Sphyrapicus thyroideus): An uncommon summer resident of high coniferous forests and burns, whose range does not include the Huntington Canyon area.

(14) Lewis' Woodpecker (Asyndesmus lewis): A little known summer resident and transient preferring scattered or logged forests, burns, cottonwood groves and Ponderosa Pine, but whose range does not include the Huntington Canyon area.

(15) Great Blue Heron (Ardea herodias): A common resident of marshes, shallow reservoirs, rivers, streams, shores and irrigation ditches. The swift water and dense streamside growth along Crandall and Huntington Creek would not be suitable habitat for a Great Blue Heron. The beaver ponds in Crandall Canyon are very small and not likely to attract a heron.

(16) Long-billed Curlew (Numenius americanus): An uncommon summer resident and transient partial to meadows, pastures, and wetlands. None of these habitats are found in Crandall Canyon, nor nearby in Huntington Canyon.

(17) Band-tailed Pigeon (Columba fasciata): An uncommon summer resident and transient of forests, canyons, foothills near mountain brush (acorns) and agricultural lands. Although not seen during the spring, summer, and fall of 1980, this species could find suitable habitat in Crandall Canyon.

(18) Sandhill Crane (Grus canadensis): A rare winter transient in prairies, grainfields and marshes, and a rare summer transient in mountain meadows and marshes. No suitable Sandhill Crane habitat is found in Crandall Canyon or nearby in Huntington Canyon.

(19) Black Swift (Cypseloides niger): An uncommon summer resident of open areas in mountain country. There is good Black Swift habitat in Crandall and Huntington Canyons. Numerous White-throated Swifts (Aeronautes saxatalis) were seen during 1980 but only a few Black Swifts.

(20) Western Bluebird (Sialia mexicana): An uncommon summer resident liking scatered trees, open coniferous forests and farms. Habitat in Crandall Canyon is suitable but none were seen during 1980.

(21) Scott's Oriole (Icterus parisorum): An uncommon summer resident keeping to Pinion/Juniper woodlands of desert mountains and to oak slopes and cottonwood trees in canyons, but whose range does not include the area of Huntington Canyon.

(22) Grace's Warbler (Dendroica graciae): An uncommon summer resident of Ponderosa Pine/Oakbrush communities of the mountains, but whose range does not include the Huntington Canyon area.

UPLAND GAME BIRDS SURVEY

Two species of Upland Game Birds inhabit Crandall Canyon in the areas of the mine site and road improvement. They are the Ruffed Grouse (Bonass umbellus) and Blue Grouse (Dendragapus obscurus). Both species brood and nest in the area. Ruffed Grouse drumming logs are reported for the canyon by the Utah Division of Wildlife Resources. Several femal Ruffed Grouse were observed during 1980 in the Spruce/Fir/Aspen vegetative community west of the proposed mine site.

STATE PROTECTED SPECIES SURVEY

State laws and regulations protect a number of vertebrates whose range and habitat affinities include Crandall and Huntington Canyon.

Amphibians: Tiger Salamander (*Ambystoma tigrinum*)

Reptiles: None

Birds: All birds are protected. Besides the twenty-two already discussed under Migratory Birds of High Federal Interest two other potential residents of Crandall Canyon are listed as rare or limited. They are:

1. Gray Jay (R) (*Perisoruis canadensis*) which likes coniferous forests;
2. Yellowthroat (L) (*Geothylpis trichas*) which inhabits willow thickets along streambeds.

Mammals: Of the seventeen mammals listed as protected whose published ranges and habitat preferences include Crandall Canyon, nine have been observed to be present:

1. Snowshoe Hare (*Lepus americanus*)
2. Mountain Cottontail (*Sylvilagus nuttallii*)
3. Beaver (*Castor canadensis*)
4. Black Bear (*Ursus americanus*)
5. Long-tailed Weasel (*Mustela frenata*)
6. Badger (*Taxidea taxus*)
7. Cougar (*Felis concolor*)
8. Mule Deer (*Odocoileus heminous*)
9. Wapiti or Elk (*Cervus canadensis*)

The remaining eight, although not observed, may inhabit or visit the area. They are:

10. Short tailed Weasel (or Ermine) (Mustela erminea)

11. Mink (Mustela vison)

12. Martin (Martes caurina)

13. Striped Skunk (Mephitis mephitis)

14. Spotted Skunk (Spilogale gracitis)

15. River Otter (Lutra candensis)

16. Bobcat (Lynx rufus)

17. Moose (Alces alces)

Development and operation of the mine will unavoidably impact these species through habitat destruction and increased human presence. Because of the narrowness of the canyon, extreme care will need to be exercised in the design and construction of the access road to minimize habitat destruction. The road should be kept as narrow as practical and cuts and fills should be severely limited, even to the point of regressing to some aspects of old style road design. Modern road design tends to glorify the smooth even grade and wide shoulder, but produces horrendous cuts and fills. Efficient use of space at the mine site would also be hoped for, with selective and needful, rather than wholesale clearing.

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN UTAH

None of the mammals or birds listed by the Federal Government as threatened or endangered, as of August 1980, reside in Crandall Canyon or nearby in Huntington Canyon. Those listed are:

Mammals:

Black-footed Ferret (*Mustela nigripes*)

Utah Prairie Dog (*Cynomys parvidens*)

Birds:

American Peregrine Falcon (*Falco peregrinus anatum*)

Arctic Peregrine Falcon (*Falco peregrinus tundrius*)

Bald Eagle (*Haliaeetus leucocephalus*)

Whooping Crane (*Grus americana*)

BIG GAME STUDY

The big game species known to inhabitat the Crandall Canyon area are the Black Bear (Ursus americanus), Cougar (Felis concolor), Wapiti or Elk (Cervue canadensis), Mule Deer (Odocileus heminus) and Moose (Alces alces).

The numerous game trails in the canyon attest to heavy use by Mule Deer and Elk. Deer were observed in the canyon on most days during 1980, both high on the ridges and at creek level. Elk signs were found high on the ridges. The canyon is used as a migration corridor for Mule Deer and Elk in the winter. Wintertime human activity in the canyon will pressure Elk to use other routes or higher trails to bypass the human presence.

In the cliffs above the mine some recent deer remains and Cougar tracks were found beneath a ledge. Black Bear tracks were seen in mud along Huntington Creek. Hunting pressure on these two species is likely to grow due to increased chance of sightings and better access.

Crandall Canyon is an important Moose habitat, especially in wintertime along the creek. Wintertime mining activities will impact Moose use of the lower 2 km of the canyon.

SURVEY OF ALL OTHER VERTEBRATES

AMPHIBIANS, REPTILES, BIRDS, AND MAMMALS

The published ranges and habitat preferences of the vertebrate species of southeastern Utah have been compared with the location and available habitats of Crandall and Huntington Canyons. The results have been prepared in tabular form and follow as Table 5.

EXPLANATION OF ABBREVIATIONS USED IN VERTEBRATE TABLES

COLUMN HEADINGS:

U	Ubiquitous
CW	Cottonwood
SG	Sagebrush
AG	Alpine Grassland
MG	Mountain Grassland
MSG	Mountain Shrub/Grassland
MSCA	Mixed Mountain Shrub/Conifer/Aspen
A	Aspen
SF	Spruce/Fir
SFA	Spruce/Fir/Aspen
R	Riparian
O	Observed on site
P	Protected by State or Federal Law

FIRST LETTER WITHIN BOXES:

C	Common (widespread and abundant)
U	Uncommon (widespread but not abundant)
O	Occasional (periodically identified over 10-15 years)
R	Rare (seldom identified in area)
L	Limited (restricted to a particular habitat)
K	Status unknown (believed present but little known)
X	Indicates "yes" in columns headed by 'O' and 'P'

SECOND, THIRD, AND FOURTH LETTERS WITHIN BOXES:

R	Resident
T	Transient
S	Summer
W	Winter

TABLE 5

AMPHIBIANS

Amphibians are always found near water. Amphibian habitat in the area is found along Huntington and Crandall Creeks and in springs and seeps found on the hillsides above the creeks.

The list below is of amphibians whose published ranges include Huntington Canyon.

Tiger Salamander (*Ambystoma tigrinum*)	CR-P
Great Basin Spadefoot Toad (*Scaphiopus intermontanus*)	CR
Western Toad (*Bufo boreas*)	K
Chorus Frog (*Pseudacris triseriata*)	CR
Leopard Frog (*Rana pipiens*)	CR

REPTILES

	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O	P
Collared Lizard (Crotaphytus collaris)				CR	CR					
Eastern Fence Lizard (Sceloporus undulatus)	CR	CR		CR	CR	CR	CR			
Tree Lizard (Urosaurus ornatus)	CR			CR	CR	CR	CR	CR		
Short-horned Lizard (Phrynosoma douglasii)		CR		CR	CR		CR			
Rubber Boa (Charina bottae)	CR					CR	CR		X	
Striped Whipsnake (Masticophis taeniatus)		CR		CR	CR					
Racer (Coluber constrictor)		CR	CR	CR	CR			CR		
Ringneck Snake (Diadophis punctatus)	K							K	X	
Gopher Snake (Pituophis melanoleucus)	CR	CR	CR	CR	CR		CR			
Milk Snake (Lampropeltis triangulum)	K	K		K	K	K	K			
Sonora Mountain Kingsnake (Lampropeltis pyromelana)	K			K	K	K	K			
Western Terrestrial Garter Snake (Thamnophis elegans)	CR	CR		CR	CR	CR	CR	CR		
Common Garter Snake (Thamnophis sirtalis)	CR				CR	CR	CR	CR	X	
Midget Faded Rattlesnake (Crotalue viridis concolor)		CR		CR	CR		CR			

BIRDS

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O
Green Heron (Butorides striatus)		RT								
Turkey Vulture (Cathartes aura)	CSR									
Goshawk (Accipiter gentilis)					UR	UR	UR	UR		X
Sharp-shinned Hawk (Accipiter striatus)		URT			URT	URT	URT	URT	URT	X
Cooper's Hawk (Accipiter cooperii)		CSRT RWR				CSRT RWR		CSRT RWR	CSRT RWR	X
Red-tailed Hawk (Buteo jamaicensis)		CR	CR	CR	CR					
Swainson's Hawk (Buteo swainsoni)			USR	USR	USR					
Golden Eagle (Aquila chrysaetos)				CR	CR					X
Blue Grouse (Dendragapus obscurus)					CR	CR	CR	CR		
Ruffed Grouse (Bonasa umbellus)							CR	CR	CR	
California Quail (Lophortyx californicus)					CR					
Mountain Plover (Charadrius montanus)					RT					
Band-tailed pigeon (Columba fasciata)						USRT				
Yellow-billed Cuckoo (Coccyzus americanus)		KSR								
Screech Owl (Otus asio)		UR							UR	
Flammulated Owl (otus flammeolus)						KSR		KSR		
Great Horned Owl (Bubo virginianus)	CR									
Pygmy Owl (Glaucidium gnoma)		KR			KR	KR		KR		
Burrowing Owl (Speotyto cunicularia)					LR					
Long-eared Owl (Asio otus)		CR			CR					
Saw-whet Owl (Aegolius acadicus)						KR	KR	KR		
Common Nighthawk (Chordeiles minor)			CSR			CSR				

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O
Black Swift (Cypseloides niger)					USR					X
White-throated Swift (Aeronautes saxatalis)					CSR					X
Black-chinned Hummingbird (Archilochus alexandri)						CSR		CSR	CSR	X
Broad-tailed Hummingbird (Selasphorus platycercus)	CSR									
Rufus Hummingbird (Selasphorus rufus)	CSRT	CSRT		CSRT	CSRT	CSRT	CSRT	CSRT		
Calliope Hummingbird (Stellula calliope)				CSR		CSR		CSR		
Belted Kingfisher (Megaceryle alcyon)		UR								
Red Shafted Flicker (Colaptes cafer)		CR				CR		CR		X
Yellow-bellied Sapsucker (Sphyrapicus varius)		CR					CR			
Hairy Woodpecker (Dendrocopos villosus)		CR				CR	CR	CR	CR	
Downy Woodpecker (Dendrocopos pubescens)		CR				CR			CR	
Northern Three-toes Woodpecker (Picoides tridactylus)								UR		
Cassin's Kingbird (Tyrannus vociferans)					USR	USR				
Ash-throated Flycatcher (Myiarchus cinerascens)					CSR	CSR				
Traill's Flycatcher (Empidonax traillii)		CSR							CSR	
Hammond's Flycatcher (Empidonax hammondii)								USR		
Dusky Flycatcher (Empidonax oberholseri)					CSR					
Gray Flycatcher (Empidonax wrightii)			KSR		KSR					
Western Flycatcher (Empidonax difficilis)		CSR				CSR		CSR		X
Western Wood Peewee (Contipus sordidulus)		CSR				CSR		CSR		

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O
Olive-sided Flycatcher (Contipus borealis)						USR		USR		
Horned Lark (Eremophila alpestris)				CR	CR					
Violet-green Swallow (Tachycineta thalassina)					CSR	CSR				X
Tree Swallow (Iridoprocne bicolor)						CSR		CSR	CSR	
Rough-winged Swallow (Stelgidopteryx ruficollis)		CSR				CSR		CSR	CSR	
Cliff Swallow (Petrochelidon pyrrhonota)					CSR	CSR				
Purple Martin (Progne subis)							USR	USR		
Steller's Jay (Cyanocitta stellari)					CR	CR		CR		X
Gray Jay (Perisorius canadensis)						RR		RR		
Scrub Jay (Aphelocoma coerulescens)		CR			CR	CR				
Black-billed Magpie (pica pica)		CR								X
Common Raven (Corvus corax)	CR									
Common Crow (Corvus brachyrhynchos)	OT									
Clark's Nutcracker (Nucifraga columbiana)								CR		X
Black-capped Chackadee (Parus atricapillus)						CSR		CSR		
Mountain Chickadee (Parus gambeli)						CSR	CSR	CSR		X
Bushtit (Psaltriparus minimus)		CR			CR	CR				
White-breasted Nuthatch (Sitta carolinensis)					CR	CR		CR	CR	
Red-breasted Nuthatch (Sitta canadensis)						CR		CR		
Pygmy Nuthatch (Sitta pusilla)						CR		CR		
Brown Creeper (Certhia familiaris)		CSR				CSR		CSR		

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O
Dipper (Cinclus mexicanus)		CR							CR	X
House Wren (Troglodytes aëdon		CSR								
Rock Wren (Salpinctes obsoletus)					CR	CR				
Canyon Wren (Catherpes mexicanus)					CR	CR				
American Robin (Turdus migratorius)	CR									
Hermit Thrush (Catharus guttatus)		CSR				CSR		CSR		
Swainson's Thrush (Catharus ustulatus)		CSR				CSR	CSR	CSR	CSR	
Veery (Catharus fuscescens)		USR								
Western Bluebird (Sialia mexicana)					USR	USR	USR	USR		
Mountain Bluebird (Sialia currucoides)						CSR		CSR		
Townsend's Solitaire (Myadestes townsendi)					CWR	CSR		CSR		
Blue-gray Gnatcatcher (Polioptila caerulea)		CSR			CSR				CSR	
Golden-crowned Kinglet (Regulus satrapa)						UR		UR		
Ruby-crowned Kinglet (Regulus calendula)		CWR			SWR			CSR		
Water Pipet (Anthus spinoletta)				CR				CR		
Bohemian Waxwing (Bombycilla garrulus)		UWR							UWR	
Soliary Vireo (Vireo solitarius)		USR			USR	USR			USR	
Warbling Vireo (Virio gilous)		CSR						CSR	CSR	X
Orange-crowned Warbler (Vermivora celata)		T			CSR	CSR	CSR		T	
Nashville Warbler (Vermivora ruficapilla)		UT				UT				
Audubon's Warbler (Dendroica auduboni)		CSR							CSR	X
Yellow Warbler (Dendroica petechia)		CSR					CSR		CSR	
Magnolia Warbler (Dendroica magnolia)						UT		UT		

	U	CW	SG	AG	MG MS G	MSCA	A	SF SFA	R	O
Yellow-rumped Warbler (Dendroica coronata)		CSR				CSR	CSR	CSR		
Townsend's Warbler (Dendroica townsendi)						UT		UT		
Mac Gillivray's Warbler (Oporornis tolmiei)		CSR							CSR	X
Yellowthroat (Geothylpis trichas)		LSR							LSR	
Yellow-breasted Chat (Icteria virens)		CSR							CSR	
Wilson's Warbler (Wilsonia pusilla)								CSR	CSR	
American Redstart (Setophaga ruticilla)		UT							UT	
Rusty Blackbird (Euphagus carolinus)		OT								
Western Tanager (Piranga ludoviciana)		CSR				CSR	CSR	CSR	CSR	X
Black-headed Grosbeck (Pheucticus melanocephalus)		CSR			CSR				CSR	
Lazuli Bunting (Passerina amoena)		CSR			CSR				CSR	
Rufus-sided Towhee (Pipilo erythrophthalmus)					CR	CR				
Dark-eyed Junco (Junco hyemalis)		CSR				CSR		CSR		
Gray-headed Junco (Junco caniceps)					CSR	CSR		CSR		X
Tree Sparrow (Spizella arborea)		UWR								
Chipping Sparrow (Spizella passerina)						CSR	CSR	CSR		
White-crowned Sparrow Zonotrichia leucophrys)					CSR	CSR		CSR		X
Fox Sparrow (Zonotrichia iliaca)		KSRT								
Black-throated Sparrow (Amphispiza bilineata)			USR		USR	USR				
Cassin's Finch (Carpodacus cassinii)						CSR		CSR		
Pine Grosbeak (Pinicola enucleator)						UR		UR		

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O
Rosy Finch (Leucosticte arctoa)				CSR						
Pine Siskin (Carduelis pinus)						CR		CR		
American Goldfinch (Carduelis tristis)		CR								
Red Crossbill (Loxia curvirostra)						USR		USR		

MAMMALS

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O	P
North Water Shrew (Sorex palustris)		CR							CR		
Merriam Shrew (Sorex merriami)		UR			UR	UR	UR	UR			
Vagrant Shrew (Sorex vagrans)		CR							CR		
Masked Shrew (Sorex cinereus)		CR			CR	CR		CR	CR		
Dusky Shrew (Sorex obscurus)					CR	CR		CR			
Little Brown Myotis (Myotis lucifugus)		CR			CR	CR					
Long-eared Myotis (Myotis evotis)						CR		CR			
Long-legged Myotis (Myotis volans)					CR	CR					
Small-footed Myotis (Myotis leibii)					UR	UR					
Siver-haired Bat (Lasionycteris noctivagans)					CR	CR	CR	CR			
Big Brown Bat (Eptesicus fuscus)		CR			CR	CR	CR	CR			
Red Bat (Lasiurus borealis)		UR			UR	UR	UR	UR			
Hoary Bat (Lasiurus cinereus)		UR			UR	UR	UR	UR			
Western Big-eared Bat (Plecotus townsendii)					CR	CR		CR			
Snowshoe Hare (Lepus americanus)		CR			CR	CR	CR	CR	CR	X	X
Mountain Cottontail (Sylvilagus nuttallii)					CR	CR	CR	CR		X	X
Red Squirrel (Tamiasciurus hudsonicus)						CR		CR		X	
Rock Squirrel (Spermophilus variegatus)		CR			CR	CR					
Uintah Ground Squirrel (Spermophilus armatus)					CR	CR		CR			
Golden-mantled Ground Squirrel (Spermophilus lateralis)					CR	CR		CR			

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O	P
Yellow-bellied Marmot (Marmota flaviventris)					CR		CR			X	
Northern Flying Squirrel (Glaucomys sabrinus)						CR		CR			
Least Chipmunk (Eutamius minimus)		CR			CR	CR	CR	CR		X	
Uintah Chipmunk (Eutamius umbrinus)					CR	CR		CR		X	
Cliff Chipmunk (Eutamius dorsalis)		UR							UR		
Northern Pocket Gopher (Thomomys talpoides)				CR	CR	CR					
Beaver (Castor canadensis)									CR	X	X
Canyon Mouse (Peromyscus crinitus)					CR	CR					
Deer Mouse (Peromyscus maniculatus)	CR										
Bushy-tailed Wood Rat (Neotoma cinerea)					CR	CR					
Muskrat (Ondatra zibethicus)		CR							CR		
Meadow Vole (Microtus pennsylvanious)		CR							CR		
Mountain Vole (Microtus montanus)			CR	CR	CR						
Richardon's Vole (Microtus richardsonii)		CR							CR		
Longtail Vole (Microtus longicaudus)					CWR	CWR			CSR		
Porcupine (Erethizon dorsatum)					CR	CR		CR			
Coyote (Canis latrans)	CR										
Red Fox (Vulpes fulva)	CR										
Gray Fox (Urocyan cinereoargenteus)					CR	CR	CR	CR			
Black Bear (Ursus americanus)	CR									X	X
Ring-tailed Cat (Bassariscus astutus)					CR	CR			CR		

	U	CW	SG	AG	MG MSG	MSCA	A	SF SFA	R	O	P
Raccoon (Procyon lotor)					OR	OR		OR	OR		
Short-tailed Weasel (Mustela erminea)		RR					RR	RR	RR		X
Long-tailed Weasel (Mustela frenata)		CR				CR	CR	CR	CR	X	X
Mink (Mustela vison)		LR							LR		X
Marten (Martes caurina)								RR			
Badger (Taxidea taxus)	CR									X	X
Striped Skunk (Mephitis mephitis)		CR			CR	CR	CR	CR	CR		X
Spotted Skunk (Spilogale gracilis)		CR				CR	CR	CR	CR		X
River Otter (Lutra canadensis)		RRT									X
Bobcat (Lynx rufus)					CR	CR					X
Cougar (Felis concolor)	CR									X	X
Mule Deer (Odocoileus hemionus)		CWR	CSR	CSR	CSR	CSR	CSR	CSR	CSR	X	X
Moose (Alces alces)						LR	LR	LR	LR		X
Wapiti (Cervus canadensis)		CWR		CSR	CSR			CSR		X	X

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