PROPOSED ENVIRONMENTAL STUDIES OF THE SKYLINE PROPERTY AND ADJACENT AREAS PURSUANT TO OSM REGULATION SECTIONS 783.19, 783.20, and 783.21

DRAFT

Prepared for

COASTAL STATES ENERGY COMPANY

Houston, Texas

By

VAUGHN HANSEN ASSOCIATES

Salt Lake City, Utah

May 15, 1979

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INTRODUCTION

Recent regulations which have been promulgated by the U.S. Department of Interior, Office of Surface Mining Reclamation and Enforcement (OSM) require that persons wishing to apply for permits to mine coal must first conduct an environmental study of the proposed mine plan area in order to ascertain and minimize potential impacts and provide a baseline whereby to judge reclamation success. In addition, surface management agencies, such as the U.S. Forest Service (USFS), Utah Division of Wildlife Resources, etc. also have responsibility towards various environmental resources which might be affected by coal mining operations.

In keeping with the above mentioned requirements, Coastal States Energy Company has requested that an environmental inventory be undertaken of the Skyline Property in Carbon and Emery Counties, Utah. The enclosed information outlies the proposed wildlife, vegetation, and soils studies to meet the needs of the agencies (particularly OSM, the Utah Division of Oil, Gas, and Mining, and the USFS) and the needs of Coastal States. Study outlines have been previously discussed to some extent with the USFS, the Utah Division of Oil, Gas, and Mining, and other agencies in order

to gain preliminary approval of study directions. Appropriate revisions have been made in the study outlines to incorporate the suggestions made by the concerned agencies. Liaison activities will continue in order to maintain agency and client cooperation and confidence.

Coastal States has requested that Vaughn Hansen Associates prepare the hydrologic inventory and oversee other portions of the environmental study. Various consultants have been contacted to provide the necessary environmental information in their field of expertise. These studies will seek to not only meet the requirements of Section 783 of the OSM regulations and the guidelines drafted by the Manti-LaSal National Forest concerning pre-mining environmental resource studies, but will also provide information which can be incorporated into the mine operation plan to reduce environmental impacts and promote reclamation (Sections 784 and 817 of the OSM regulations). For convenience, USFS and OSM regulations have been referenced in the study outlines.

The outlined environmental studies will seek to acquire information from not only the immediate permit area but also the entire lease or mine plan area and those adjacent areas which will be directly affected by mining activities. The effect of mining on the general area surrounding the Skyline Property will also be determined, in order to provide information regarding the regional impact of mining in the lease area. It should be noted, however, that particular attention will be paid to those areas where surface disturbances are contemplated (yards, roads, etc.). Efforts will be

coordinated with the Utah Division of Oil, Gas, and Mining to properly define the extent of the adjacent area, the affected area, and the general area.

It is the desire of Coastal States Energy Company to submit the environmental resource information with the mining permit application in October, 1979. In order to meet this schedule, it is hoped that agency review of these study outlines can be completed and recommendations received by June 1, 1979.

VEGETATION AND SOILS STUDY PLAN
OF ECCLES CANYON AND THE SKYLINE PROPERTY LEASE AREA
FOR COASTAL STATES ENERGY COMPANY

DRAFT

By

Stanley L. Welsh and Joseph R. Murdock
Brigham Young University
Provo, Utah

May 1979

I. Vegetation

A. Maps (Scale 1:6000)

1. Vegetation maps of the lease area will include the broad general vegetation types as mapping units. Differences in sub-types such as topo-edaphic induced differences will be included as much as possible. A complete floristic species list will accompany each mapping unit.

2. A detailed large scale map of the yard area will be provided. As this area will be completely destroyed, the map and accompanying species list will provide a record and basis for reclamation procedures.

Existing detailed Forest Service range analysis maps and aerial photographs will be analysed. Reconnaissance travel by vehicle and hiking will provide a basis for delineating mapping units in relation to topographic and soil differences.

B. Community Analysis

Study sites will be selected to represent slope differences and streamside conditions throughout the lease area. At three different locations in the lease area a transect of approximately 40 plots will be studied on: (1) north facing slopes, (2) south facing slopes, (3) gently sloping uplands, and (4) streamside. This study plan will provide three replications of each of the major topographic, vegetation, and soils differences.

Information to be obtained will include:

1. Percentage cover. Canopy coverage by species will be estimated on 2 decimeter by 5 decimeter (or larger) plots;

2. Percent frequency. A measure of ubiquity of each species will be determined;

3. Percent composition. The importance of the contribution of each species to the community will be determined; and

4. Herbage production. A weight estimate of the available forage production will be taken at each site for the dominant forage species. For certain tree and browse species, the productivity estimates will be made on twig and/or annual ring measurements.

All transects will be permanently marked with iron stakes and the locations given so that periodic long term studies can be undertaken. The above information will also be obtained in the yard area.

II. Soils

At each vegetation study site a soil pit will be excavated to provide descriptive information and sample collections. Additionally there will be 100 penetrometer readings made to provide correlation of the average soil depth with vegetation differences.

This information in the yard will assist in estimating the amount of topsoil to be saved from this area.

Include soil map

A. Classification

The profile description and measurements will allow for the classification of the soils into units compatable with the most recent soils classification approximation used by the Soil Conservation Service.

B. Analysis

Soil samples will be collected and removed to the laboratory for determinations of:

1. Texture, using the hydrometer method;
2. Total soluble salt content, using a wheatstone bridge;
3. Soil reaction using a Beckman pH meter;
4. Organic matter content, based on weight loss on ignition;
5. Water available for plant growth, from pressure membrane determination of the approximate wilting percent and field capacity; and
6. Chemical analyses, determining the sodium absorption ratio and the presence of nitrogen, phosphorus, and potassium.

III. Stabilization and Revegetation of Disturbed Areas

In those areas where road cuts, conveyor line construction, or any mechanical disruption of topsoil may occur (especially the stockpiled soil from the yard area), stabliization plans will be derived using methods and plant species that have proven

successful in nearby areas. Stabilization plans will include options for use and/or storage of stockpiled soil. Where the topsoil is used during the interim period for landscaping of surface facilities, plans will be developed for use of that soil in final rehabilitation efforts. Slopes requiring stabilization during operational phases will be revegetated soon after disturbance so as to not require further disturbance at close of operation.

Combinations of hydro-mulch, cyclone seeding or broadcasting by hand, and hand set planting of native browse species will insure a plant cover of a permanent nature. The use of native plants and naturalized species proven to be successful in such areas as road cuts in Fairview, Ephraim and Salina Canyons have the best chance of success. Hundreds of acres of badly abused rangelands and terraced areas have been successfully revegetated in nearby areas. These areas will be examined to determine the anticipated success of the revegetation program. Native plants near the disturbed sites in Eccles Canyon could include: snowberry, Vasey sage brush, lanceleaf rabbitbrush, quaking aspen, and willow. Use of these species along with others will insure a permanent cover of palatable species for wildlife and also provide erosion control.

A list of species with a known seed of propagule supply:

Grasses:

Smooth Brome (Lincoln)

Timothy

Alpine Fescue

Orchard Grass

Native Brome

Native poa species

Forbs:

Sweet Anise

Yellow Sweet Clover

Small Burdette

Lewis Flax (Native)

Alfalfa (Ladac or Nomad)

Browse:

Sagebrush

Rabbitbrush

Snowberry

Aspen

In the long range reclamation plan to return to native or original conditions, it would be desirable to observe the successful species, select mostly native species, and hand plant certain tree species such as blue spruce on the north slopes and quaking aspen on the south slopes.

-AQUATIC ENVIRONMENTAL ASSESSMENT-
SITE OF PROPOSED UNDERGROUND COAL MINE
COASTAL STATES ENERGY COMPANY

Prepared by:

Dr. Robert N. Winget
Aquatic Ecology Lab
Brigham Young University
Provo, Utah 84602

DRAFT

Prepared for:

Vaughn Hansen Associates
2 April 1979

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SITE OF PROPOSED UNDERGROUND COAL MINE
COASTAL STATES ENERGY COMPANY

Prepared for Vaughn Hansen Associates
April 1979

RESOURCE DESCRIPTION

General

The selected property designated for the Coastal States Energy Company Mine (referred to hereafter as CSE) encloses the better part of 10 sections within Townships 12 and 13 South and Range 6 East on Scofield, Utah Quadrangle (USGS Map N3930-W11100/15), 1923) (Figure 1).

The climate of this area is semi-humid montane with most of the annual precipitation (30-40 inches) being in the form of winter snow. Soils are predominantly silty sands with some shale and mudstone from the Cretaceous period. Sagebrush-grass vegetation characterizes the canyon bottoms and side hills with areas of wet meadow immediately adjoining the streams, especially Huntington Creek. Scattered aspen with Douglas fir and spruce occur on the north facing slopes.

Both upper Huntington Creek and Eccles Creek provide essential habitat for naturally reproducing resident populations of cutthroat trout. Electric Lake cutthroat trout also use upper Huntington Creek for spawning and nursery activities. Also present in these creeks are speckled dace, mountain suckers and mottled sculpins. Rainbow and brown trout have also been reported for upper Huntington Creek, but it is questionable if they are still present. Utah Division of Wildlife Resources is attempting to eliminate brown trout from Electric Lake and upper Huntington Creek and has stopped

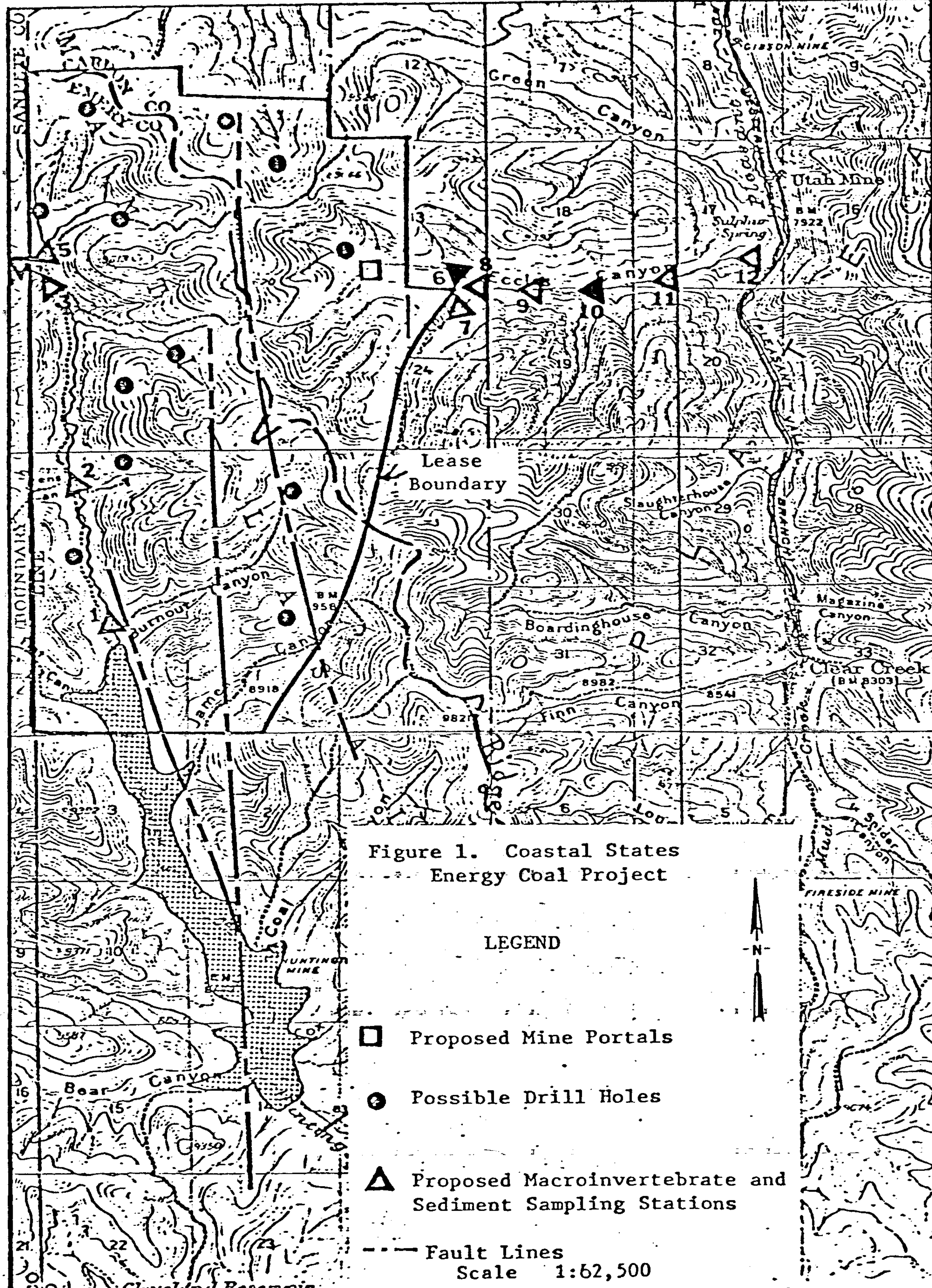


Figure 1. Coastal States Energy Coal Project

stocking this section of stream. Upper Eccles Creek probably is too small to provide trout habitat but this needs to be verified.

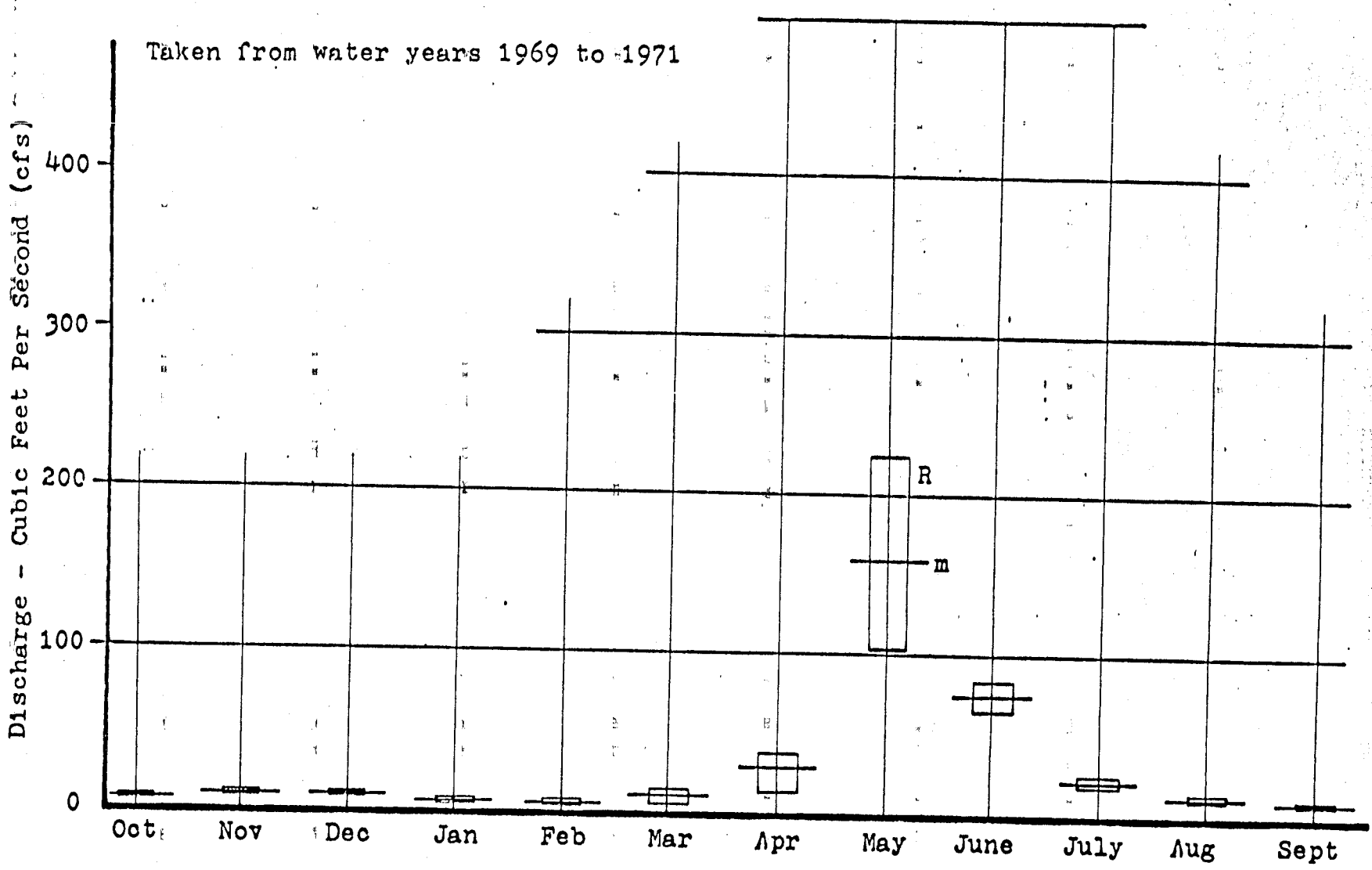
Stream discharges in upper Huntington Creek ranged from low monthly mean flows near 5 cfs (October-February) to high monthly mean flows in May near 100 cfs during dry years to over 200 cfs during above average snowfall years (Figure 2).

Water temperatures in Upper Huntington Creek fluctuate greatly due to low flows and exposed channels. Figures 3, 4 and 5 illustrate the wide temperature fluctuations during three periods of 1971. During November to March the water temperature remains fairly constant, staying between 0-2° C. In the warmer months it is not uncommon to have a daily fluctuation of 12-15° C. The aquatic organisms have evolved with a tolerance to these thermal changes over a short period of time but many species are highly susceptible to changes beyond their natural evolutionary exposure.

Both upper Huntington and Eccles Creeks intersect mostly Black Hawk Group and Castlegate Sandstone formations. These formations are chiefly sandstone with some mudstone, shale and coal. Through natural erosion, streams intersecting these formations have periods of relatively high sedimentation.

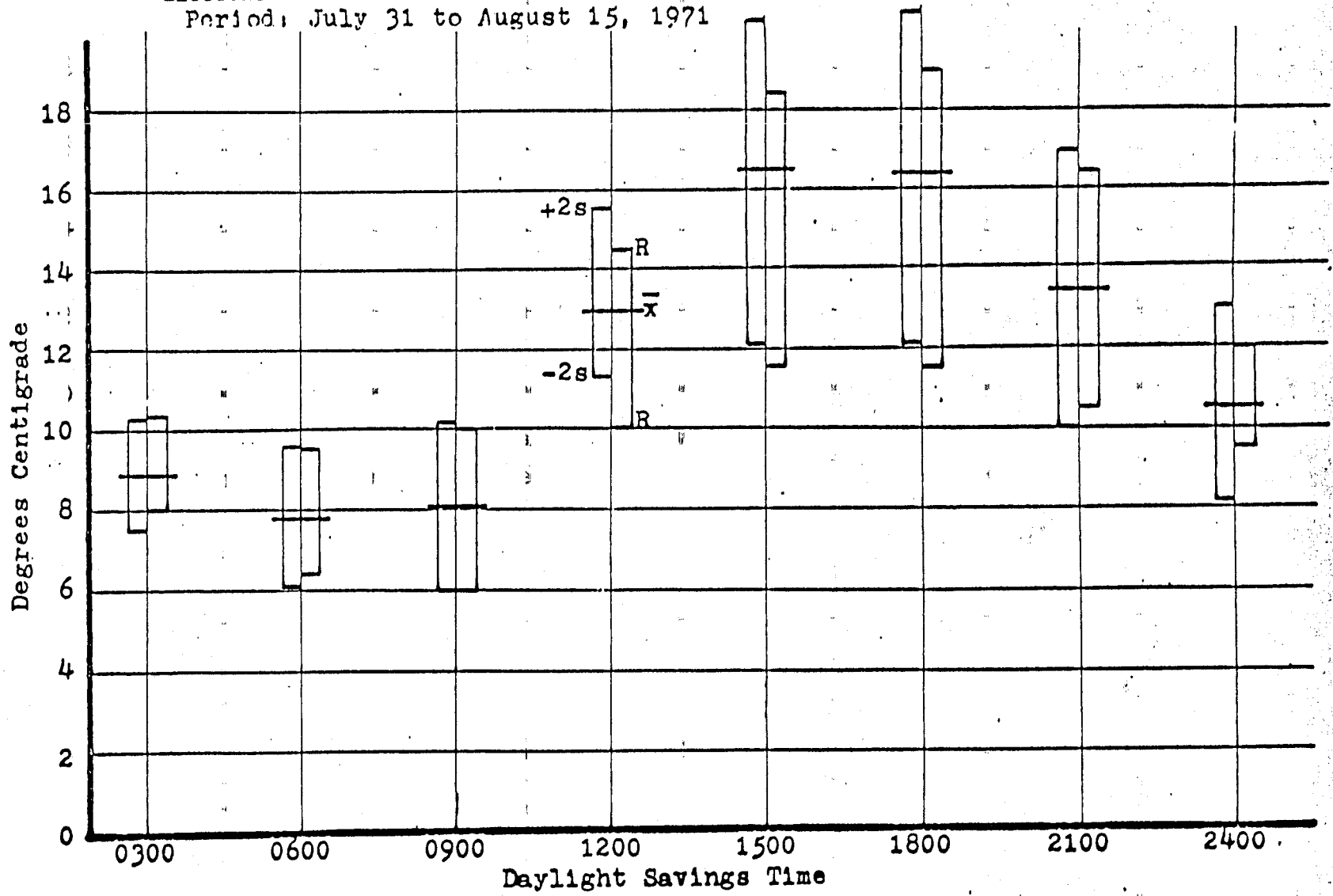
The aquatic communities of these streams have evolved to tolerate the natural sediment levels, but during recent history man-controlled activities--sheep and cattle grazing, road and dam construction, mining, fires and recreation--have resulted in considerable watershed degradation and erosion. This has resulted in periods of above natural sedimentation of these streams. One result of this increased sedimentation has been the periodic elimination of one or more age classes

Figure 2. Range and Mean of Monthly Mean Discharges of Huntington Creek immediately below confluence with Badger Creek.



R = range of monthly mean discharges
m = mean of monthly mean discharges

Figure 3. Mean Fifteen-Day Water Temperature Profile of Huntington River 1/2 km above Electric Lake.
Period: July 31 to August 15, 1971



$\bar{x}$ = mean s = standard deviation R = range of measurements

Figure 4. Mean Fifteen-Day Water Temperature Profile of Huntington River.

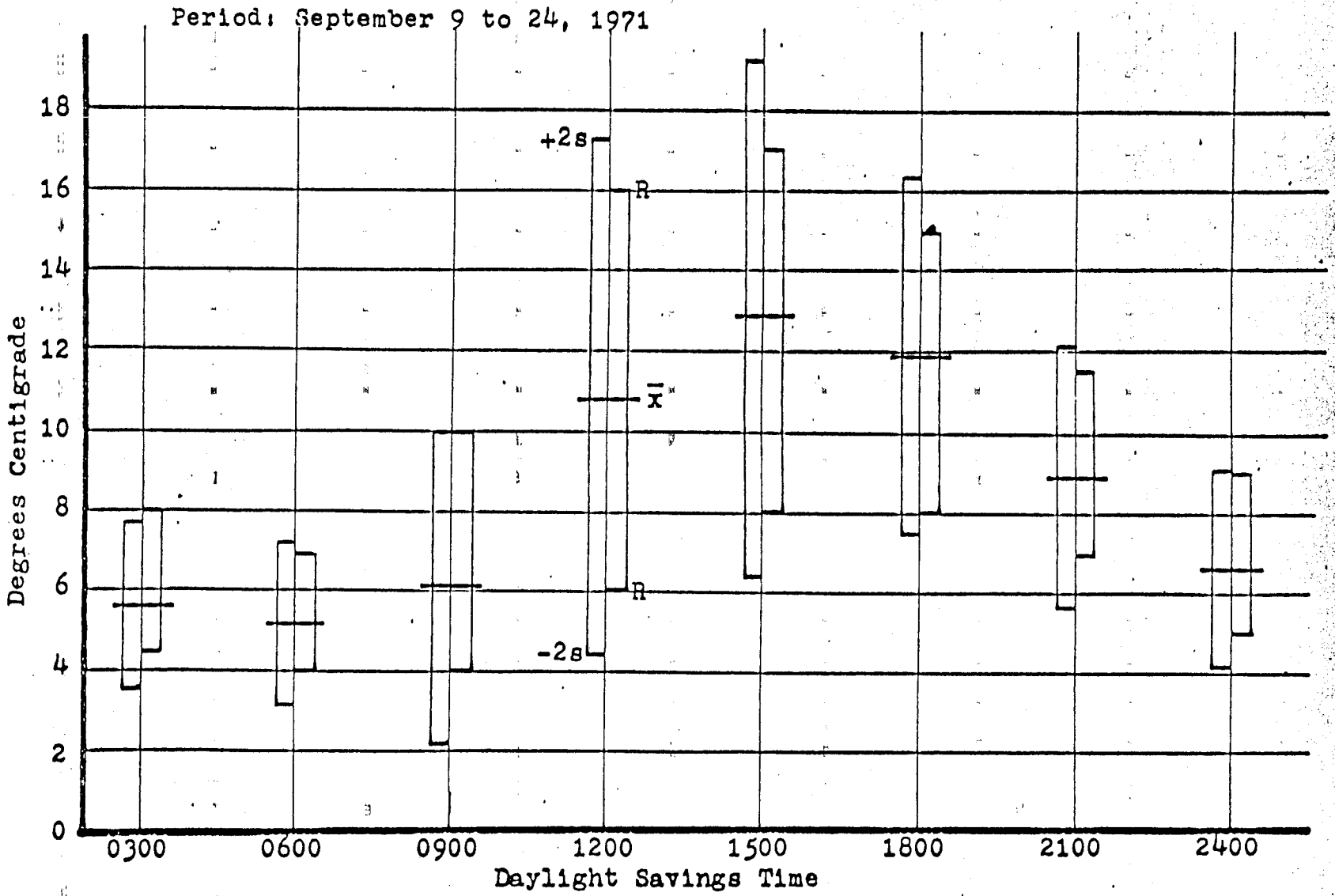


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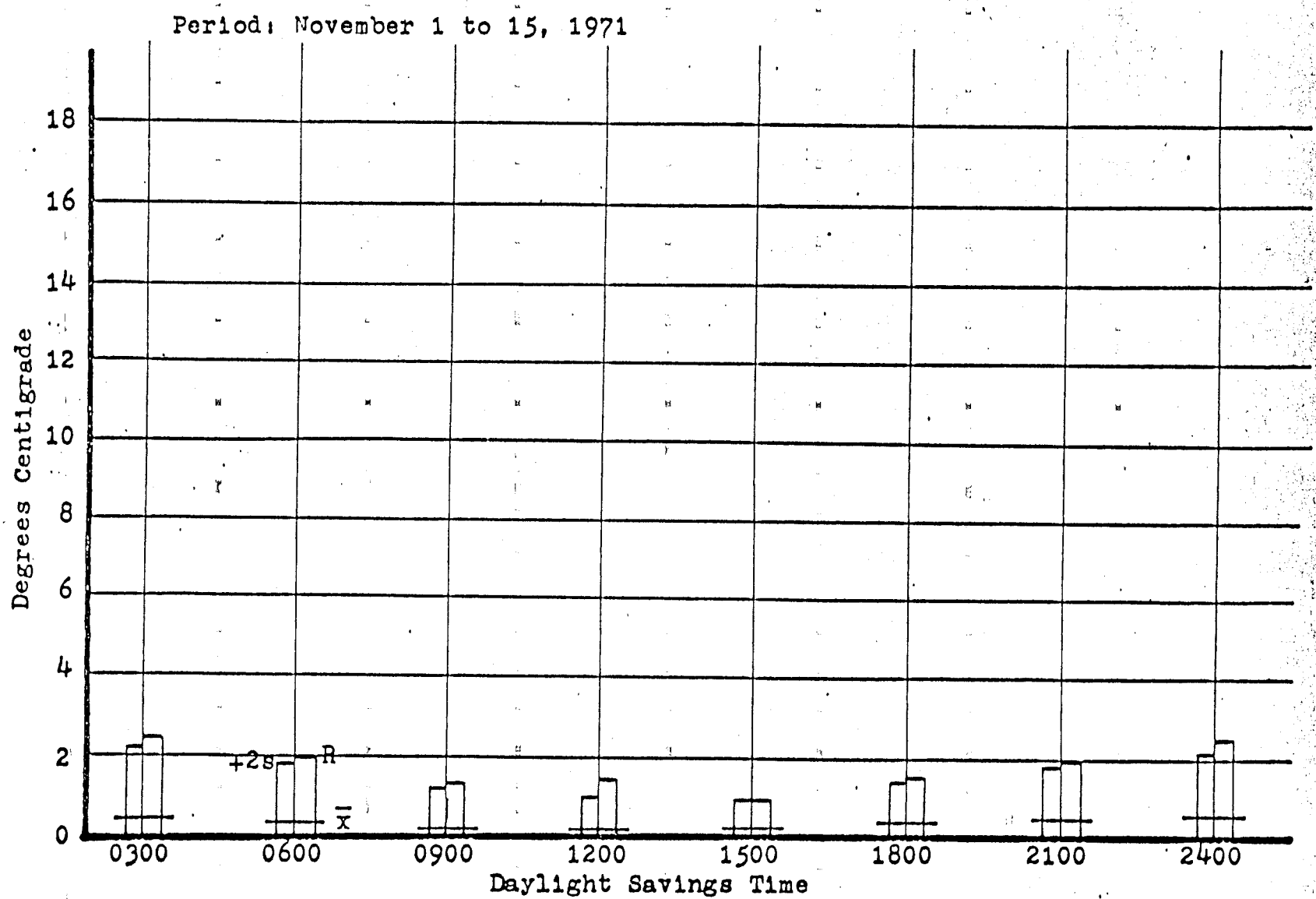
Figure 5. Mean Fifteen-Day Water Temperature Profile of Huntington River.



$\bar{x}$ = mean s = standard deviation R = range of measurements

of fishes making it necessary for Utah Division of Wildlife Resources to bolster up the populations with plants of fingerling trout.

The macroinvertebrate community of Huntington Creek above Electric Lake has considerable diversity. Representatives exhibit a broad range of tolerance to environmental perturbations. Some are fragile clean water species while others are faily "tough" or resistant. Any environmental change in Huntington Creek or its drainage will be reflected in the macroinvertebrate community.

Overgrazing in the past resulted in severe stream bank erosion, but better range management the last five years has allowed some recovery in riparian vegetation and bank stability.

Water quality is excellent for most uses. Electric Lake is phosphate limited with nitrate nitrogen near limiting indicating the clean nature of Huntington Creek waters. Vaughn Hansen Associates have considerable water quality information and will report on specific parameters.

Macroinvertebrate Communities

The macroinvertebrates of Huntington Creek during 1976-1978 exhibited signs of environmental perturbations (1976-1978) compared to 1972-1976. There have been significant increases in chironomid midge larvae, simuliid blackflies, oligochaete worms and elmid beetles (Tables 1 and 2). This would indicate an organic enrichment of the waters.

Organic enrichment in this type of habitat is usually associated with vegetation removal and/or heavy grazing by domestic animals--cattle and sheep. In the study area the USFS has tightened their control of grazing the past five years with decreased animal day

Table 1. Mean Number Per Meter Squared of Selected Taxa during June/July 1972-1978, Upper Huntington Creek, 1/2 km above Electric Lake.

	20 June 1972	26 June 1973	25 June 1974	24 June 1975	17 June 1976	29 July 1977	13 July 1978
Ephemeroptera							
Unidentified	6230	724	2069	280	2294	2740	775
Baetidae	1159	1052	2313	659	1268	6341	16,032
Cinygmula sp.	328	686	1178	403	1740	*	872
Rhithrogena sp.	65	--	--	--	--	--	--
E. doddsi	46	16	137	--	52	29	--
E. grandis	22	--	13	--	48	14	67
Plecoptera							
Unidentified	264	116	210	159	551	86	215
Nemoura sp.	-	8	--	59	111	--	--
Pteronarcella sp.	--	--	13	--	5	--	--
Trichoptera							
Unidentified	140	38	86	--	9	359	86
Rhyacophila sp.	234	194	207	56	341	201	75
Oligohplebodes sp.	--	--	--	--	5	--	--
Brachycentrus sp.	11	--	--	8	--	--	--
Coleoptera							
Unidentified	--	--	35	8	--	--	--
Elmidae	675	169	511	143	551	875	560
Diptera							
Unidentified	--	38	35	78	140	72	32
Antocha monticola	--	--	--	--	--	29	22
Hexatoma sp.	19	97	605	--	54	43	11
Chironomidae	4842	4912	882	3126	8086	17,073	15,462
Simuliidae	1323	221	1326	81	8170	2525	603
Ahterix variegata	11	--	30	--	--	14	--
Miscellaneous invertebrates	264	3704	89	1243	2719	3472	2668

Table 2. Mean Number Per Meter Squared of Selected Taxa during Oct./Nov. 1972-1978, Upper Huntington Creek, 1/2 km above Electric Lake.

	28 Oct. 1972	8 Oct. 1973	8 Oct. 1974	11 Nov. 1976	11 Nov. 1977	8 Oct. 1978
Phylum Arthropoda						
Insecta						
Ephemeroptera						
Unidentified	5552	6112	4204	2572	6039	3637
Baetidae	3303	22,284	4759	3519	3906	3637
Cinygmula sp.	5552	9100	9340	1237	2475	6047
Rhithrogena sp.	--	--	35	11	--	--
E. doddsi	560	538	156	140	--	250
E. grandis	65	124	56	32	65	131
Plecoptera						
Unidentified	430	608	713	592	258	592
Nemoura sp.	--	46	--	--	--	--
Pteronarcella sp.	--	--	--	--	--	--
Isogenoides sp.	--	8	-	43	11	--
Trichoptera						
Unidentified	430	196	317	65	1291	215
Rhyacophila sp.	624	1079	769	183	2034	334
Coleoptera						
Unidentified	--	--	--	140	--	
Elmidae	861	901	1337	226	4681	1420
Diptera						
Unidentified	301	256	202	118	108	624
Antocha monticola	--	--	--	97	194	--
Hexatoma sp.	--	116	24	11	24	--
Chironomidae	7790	8635	3855	11,545	26,115	32,388
Simuliidae	237	105	97	22	140	732
Atherix variegata	--	--	--	--	11	--
Miscellaneous Invertebrates	366	1001	882	506	2725	4175

allotments. The stream banks of Upper Huntington Creek are visibly more stable and better vegetated now than during 1970-1975. It is not reasonable to assume, then, that organic enrichment is coming from cattle or sheep.

A girl's camp--MIA-Shalome-- has been under development since about 1970 on a small tributary to Huntington Creek, entering from the west. Developers often over-emphasize their enthusiasm and importance by bull-dozing as much land as possible. This appears the case at MIA-Shalome. Numerous trees were needlessly removed; grasses, herbs and shrubs were removed and drainage and run-off was all directed into the natural stream. It appears likely that the change in macroinvertebrates is a response to impacts from this development and/or other recreational/dwelling units in the area rather than animal grazing activities.

It will be important for CSE to define this non-point degradation before beginning their project so they can avoid being blamed for other users' impacts. This supports the need for on-going seasonal monitoring. Proposed sampling sites are represented by the open triangles on the map of the study area (Figure 1).

Table 3 contains a summary of macroinvertebrate data collected on 5 October 1978 at four stations as part of this study. The presence of high numbers of Cinygmula and E. doddsi mayflies plus a relatively high diversity of taxa indicate good conditions in both Huntington and Eccles Creeks. The dominance by chironomid midges and Baetis mayflies indicates seasonal stresses to the community. Periodic stress periods are often natural occurrences in small high mountain streams--large differences between high and low

Table 3. Macroinvertebrate Community Data from Four Stations, 5 October 1978. Station 1 - Huntington Creek 1/2 km above Electric Lake; Station 2 - Huntington Creek, right fork, 0.1 km above Swen's Canyon; Station 3 - Eccles Creek above South Fork; Station 4 - Eccles Creek 1.3 km below South Fork.

	Stn. 1 $\bar{x}$ No/m^2	Stn. 2 $\bar{x}$ No/m^2	Stn. 3 Qual.	Stn. 4 Qual.
Phylum Aschelminthes				
Nematoda	151	129	--	*
Phylum Mollusca				
Pelecypoda	118	22	--	--
Phylum Annelida				
Oligochaeta	807	194	*	*
Phylum Platyhelminthes				
Turbellaria	70	--	*	*
Phylum Arthropoda				
Arachnida				
Hydracarina	1517	1496	*	*
Crustacea				
Copepoda	904	108	--	--
Ostracoda	603	86	*	*
Insecta				
Collembola	--	--	*	*
Ephemeroptera				
Siphlonuridae				
Ameletus sp.	--	--	*	--
Baetidae				
Baetis spp.	2690	6176	*	*
Heptageniidae				
Cinygmula sp.	6047	6434	*	*
Leptophlebiidae				
Paraleptophlebia sp.	3126	2862	*	*
Ephemerellidae				
Ephemerella grandis	--	65	--	--
E. doddsi	387	290	--	*
E. inermis	495	549	*	*
Plecoptera				
Nemouridae				
Zapada sp.	108	32	*	*
Prostoia besametsa	--	--	--	*
Capniidae	97	--	*	*
Perlodidae	--	--	*	--
Megarcys sp.	5	--	*	*
Diura knowltoni	22	22	--	--
Isoperla fulva	75	54	--	*
Chloroperlidae	312	516	--	--

Table 3. Continued.

	Stn. 1 $\bar{x}$ No/m^2	Stn. 2 $\bar{x}$ No/m^2	Stn. 3 Qual.	Stn. 4 Qual.
Trichoptera				
Rhyacophilidae				
Rhyacophila sp.	334	366	*	*
Hydropsychidae				
Parapsyche sp.	--	--	*	--
Hydroptilidae				
Hydroptila sp.	22	--	--	--
Limnephilidae				
Dicosmoecus sp.	--	3	--	--
Hesperophylax sp.	43	--	*	--
Oligophlebodes sp.	22	--	--	--
Neothremma sp.	--	--	*	--
Lepidostomatidae				
Lepidostoma sp.	86	--	--	--
Brachycentridae				
Micrasema sp.	--	11	--	*
Helicopsychidae				
Helicopsyche borealis	11	--	--	--
Coleoptera				
Elmidae	1420	2894	*	*
Diptera				
Tipulidae				
Dicranota sp.	161	86	--	--
Hexatoma sp.	--	48	--	--
Holorusia sp.	27	--	*	*
Ptychopteridae	--	--	--	*
Psychodidae				
Pericoma sp.	11	--	*	*
Dixidae	--	--	*	--
Simuliidae	732	796	*	*
Chironomidae	32388	19250	*	*
Ceratopogonidae	409	43	--	--
Stratiomyidae	--	--	--	*
Empididae	22	--	--	--
Total No/m^2	53,219	45,542	--	--
Dry Wt. gm/m^2	7.69	4.91	--	--
No. Taxa	32	26	21	24
% SEM	18.85	28.43	--	--
Coeff. of Var.	37.70	56.86	--	--
$\bar{d}$	2.327	2.696	3.092	2.627
No. of Samples	4	4		

*Present in qualitative samples, no density counts taken

--Not present in samples

discharges; heavy sedimentation during run-off; large temperature fluctuations. Evidence presented in Table 1 indicates that the dominance by several taxa in October 1978 was not due alone to natural stress but, rather, is increasing due to man-caused stresses.

Because of high altitude, small stream size and severe natural environmental changes, these small streams are highly susceptible to additional stresses, especially during seasons of relative stability. Aquatic organisms have evolved so the most fragile stages of their life cycles occur during periods of least environmental stress--deep winter during ice cover and low temperatures; mid-summer after spring run-off but prior to frequent summer storms; and late fall prior to winter storms and freeze-up.

The presence of Rhyacophila caddisflies, E. doddsi mayflies and four-six taxa of stoneflies (Plecoptera) at each station is evidence of a biotic community containing fragile as well as tolerant taxa; having algae eaters, predators, scavengers, shredders, etc.; and having a good resilience to wise resource use.

Substrate Composition

Sediment samples have been taken on an irregular basis since 1975 at a station on Huntington River 1/2 km above Electric Lake, as part of a Utah Power and Light funded study of Electric Lake Impacts on Huntington River. The author or this section, Dr. Robert Winget, took these samples. Table 4 contains a summary of results of these samplings. The one critical measurement related to biotic potential is the percent of materials finer than 0.85 mm in diameter. The critical level is 15% with less than that desirable. Some fine materials are beneficial but over 15% seems to allow smothering of fish eggs and juveniles as well as many species of macroinvertebrates.

Table 4. Sediment Composition as Percent by Weight for Five Size Classes at Huntington River 1/2 km Above Electric Lake, 1975-1978.

Particle Size	21 Oct. 75	10 June 76	10 Aug. 76	11 Nov. 76	29 July 77	15 Aug. 78	31 Aug. 78	26 Sept. 78	17 Oct. 78	7 Nov. 78
Gravel > 4.75 mm	80.2	75.9	76.1	78.0	69.1	82.0	75.5	83.3	82.9	73.0
Coarse Sand 2.0-4.75 mm	7.0	7.7	10.2	6.9	9.1	7.0	8.4	5.7	3.7	10.0
Medium Sand 0.50-1.99 mm	6.2	7.4	7.6	6.4	10.4	3.4	5.6	3.4	4.0	11.3
Fine Sand 0.074-0.49 mm	2.9	7.0	5.3	8.3	9.6	7.3	9.9	6.9	8.9	5.0
Silt/Clay < 0.074 mm	3.6	2.0	0.8	0.4	1.8	0.3	0.6	0.7	0.5	0.7
Fines < 0.850 mm	9.1	12.6	9.1	11.6	18.9	8.4	11.7	8.1	11.0	10.3

Only during the drought year of 1977 did the percent fines (< 0.85 mm) exceed 15% when a measurement of 18.9% was taken. The other measurements describe the breakdown of substrates by size class. These samples were all taken from fish spawning gravel beds--gravels of approximately 2-5 cm in diameter mainly.

Table 5 compares October sediment samples from two stations of Huntington Creek. There was little difference between these stations. Station 2 had a slightly higher gradient and with such would have a slightly lower level of fines. Both stations had sediments suitable for trout spawning, at least as far as percent fines are concerned.

Fisheries

Eccles Creek. Eccle's Creek is a Class III stream with natural reproduction. It is a Class III due to its small size. Fish surveys by Utah Division of Wildlife Resources in 1968, 1971 and 1977 all produced cutthroat trout resulting from natural reproduction as there has been no stocking of trout in the stream since 1967. Fish are mostly small in size--on 25 August 1971 at one station 21 fish at 0-3.5 inches, 15 at 3.5-4.5 inches, 18 at 4.5-6.5 inches and 3 at 6.5-8.5 inches were collected. Similar size distribution was observed during 1977.

A summary of "Age-Growth of Cutthroat Trout Taken In Eccles Creek from Two Sections" appears in Table 6 (taken from UDWR field collection records, 25 August 1971).

Eccles Creek habitat and fisheries resources are summarized in Tables 7 and 8. It is apparent that the only limiting factors to a successful fisheries in Eccles Creek are stream flows and man's activities.

The above data came from the lower half of Eccles Creek. The

Table 5. Sediment Composition as Percent by Weight for Five Size Classes at: (1) Huntington River 1/2 km above Electric Lake; and (2) Right Fork of Huntington River 0.1 km above Swen's Canyon, 5 October 1978.

Particle Size	Station 1	Station 2
Gravel > 4.75 mm	77.4	76.1
Coarse Sand 2.0-4.75 mm	5.7	9.0
Medium Sand 0.50-1.99 mm	6.1	8.0
Fine Sand 0.074-0.49 mm	10.1	6.2
Silt/Clay < 0.074 mm	0.7	0.7
Fines < 0.85 mm	13.7	9.4

Table 6. Age-Growth of Cutthroat Trout Taken in Eccles Creek from Two Sections (UDWR Field Records, 8/25/71).

Age Class	Mean Size MM	Range MM	Mean Weight GMS	Range GMS	No.	%
0	56	45-67	7.5	5-10	2	3
1	118	78-175	27.3	10-60	68	79
2	198	180-228	95.0	75-125	15	17
3	257	---	170.0	---	1	1
					86	

Comments:

1. Possibly some 1+ are 2+ fish.
2. 0+ age class were not recovered, due to size.
3. No non-game species were collected.

Table 7. Stream Survey of Eccles Creek 1 1/2 miles above confluence with Mud or Pleasant Valley Creek, 25 August 1971.

UTAH STATE DIVISION OF FISH AND GAME 19
(Sheet No. 2)

Date August 25, 1971 Collection No. 1-2-1 Investigator John Livesay

Catalog No. II.K.20.b (4) Stream Eccles Creek

Tributary to Mud Creek Drainage Green River

Report no. 1 of reports.

Location of station 1-1/2 miles up from confluence of Mud Creek.

Length of Station 528' Elevation of Station 8100'

Temperature		Discharge		Bottom Type	
Time	2:00 P.M.	Velocity fps	1.8	Boulders	0 %
Air	62°	Volume cfs	3.6	Rubble	33 %
Water	54°	Maximum	No record	Gravel	48 %
Time		Date		Sand	0 %
Air		Minimum		Silt	19 %
Water		Date	No Record	Other	%

Average Channel 6.6'

Average width of stream 5.8' ft. Area of station 3062.4 sq. ft.

Pools: No. per 1/10 mile 10 Ave. width 6.9' Ave. length 8.3' Ave. Depth 1.34'

Bank cover composition Willow (Ab) Grass (Ab) Sedge (c) Equisetum (S)

% bank stabilization RB 88% LB 76 % stream shaded RB 34% . LB 43%

Pollution (types, sources, amounts, etc.) None

Turbidity	None	Aquatic Vegetation	Good
pH	8.2	Absent	
Phenol. Alk.		Sparse	X
Methyl Orange	256.5	Common	
D.O	8.0	Abundant	
C.O.$_2$	3.4	Major types	Fil Green Algae

Bottom fauna	Good
Absent	
Sparse	
Common	X
Abundant	
Major types	Trichoptera (c) Tendipedidae (s) Coleoptera (Sp) Ephemeroptera (c)

Remarks Pools: Cover = 59%, Rating = B-. Pools are good in this area with sufficient cover. Spawning habitat and food are suitable. Volume of water is the only limiting factor.

Table 8. Stream Survey of Eccles Creek 0.3 miles above confluence with Mud or Pleasant Valley Creek, 25 August 1971.

UTAH STATE DIVISION OF FISH AND GAME (Sheet No. 2)

Date August 25, 1971 Collection No. 1-1-2 Investigator John Livesay

Catalog No. II.K.20.b.(4) Stream Eccles Creek

Tributary to Mud Creek Drainage Green River

Report no. 2 of reports.

Location of station .3 miles up fromconfluence of Mud Creek.

Length of Station 528' Elevation of Station 7900'

Temperature		Discharge		Bottom Type	
Time	3:30 P.M.	Velocity fps	1.5	Boulders	5 %
Air	65°	Volume cfs	3.6	Rubble	39 %
Water	54°	Maximum	No Record	Gravel	51 %
Time		Date		Sand	0 %
Air		Minimum	No Record	Silt	5 %
Water		Date		Other	%

Average channel 6.6'

Average width of stream 5.8' ft. Area of station 3062.4 sq. ft.

Pools: No. per 1/10 mile 2 Ave. width 7.5' Ave. length 10 ft. Ave. Depth .7'

Bank cover composition Grass (Ab) Sedge (C)

% bank stabilization RB 74% LB 80 % stream shaded RB 13% LB 16%

Pollution (types, sources, amounts, etc.) None

	Aquatic Vegetation	Bottom fauna
Turbidity None	Good	Good
pH 8.2	Absent	Absent
Phenol. Alk. 0	Sparse X	Sparse
Methyl Orange 205.2	Common	Common
$C.O._2$ 2.6	Abundant	Abundant X
	Major types	Major types Ephemeroptera (A)
	Fil. Green Algae	Trichoptera (C) Simuliidae (C)
		Coleoptera (S) Tendipedidae (S) Plecop (S)

Remarks Pools: 15% cover, Rating = C. Pools are lacking in this segment and the ones that are there do not appear very good. The area is good for spawning and excellent in food.

fisheries in the upper portion, especially on lease lands, are probably of low quality or non-existent. Proposed surveys during 1979 should clarify the extent of a trout fisheries above Whiskey Canyon.

Huntington Creek above Electric Lake. UDWR consideres this section of stream to be a recruitment area for Electric Lake cutthroat trout. This is presently being documented. Since completion of Electric Lake Dam in late 1973 and closing of spillway gates the winter of 1974, the number of cutthroat trout collected per survey of two 0.1 mile stream sections has increased yearly--104 fish in 1974, 122 fish in 1975, 159 fish in 1976, and 263 fish in 1977. The percent frequency of smaller fish is increasing indicating increased reproduction since the beginning of filling Electric Lake. Samples were taken the last of July each year to avoid collecting spawners from Electric Lake; thus numbers are more indicative of resident fish and/or recruitment stock for Electric Lake.

This section of Huntington Creek is a high quality cutthroat trout fishery important to the total fisheries resources of the Manti-LaSal area. Impacts to this stream, if any, from the Skyline Project would not occur during the first 10-15 years of the project.

Winter Quarters Creek. Surveys were made of Winter Quarters Creek in 1968 and 1971. In 1968 from a 0.1 mile reach 70 cutthroat trout were collected. In 1971 from a 0.1 mile reach 54 cutthroat trout were collected. Maximum size was 14 inches in 1968 and 9 inches in 1971. Young fish were present indicating successful spawning. Substrates were 38-42% spawning gravels and banks were 70% stable. There was a lack of good quality pool habitat with low flows being the main limiting factor to fish production. Stoneflies, mayflies, and

caddisflies were common indicating high water quality. This stream is important to the fisheries resources of the study area.

No impacts from the Skyline Project are anticipated for this stream.

PROPOSED MONITORING PROGRAM

The project area (Figure 1) is in the midst of an intensive land-water use area, each user adding their impacts to the aquatic resources. Many existing impacts are non-point but still important. It is imperative for any proposed user to document the levels and sources of existing perturbations prior to and during development of his project to prevent being charged with liability for those impacts. The main purpose of environmental monitoring is to prevent and or minimize impacts through wise project planning which is the basis for reasonable mitigation with resource controlling agencies. Good base line data also allows project impacts to be detected and corrected.

Huntington Creek is showing degradation from upstream users at present and Eccles Creek has already received serious impacts by Valley Camp Mine. Monitoring should: (1) describe existing resources; (2) detect existing perturbations; and (3) provide the basis for wise project planning and project restoration.

The proposed biological (macroinvertebrate, fish and sediment) monitoring stations are shown in Figure 1 as open triangles. Sampling dates are limited by weather, but June, August and late October samplings should be possible. Samples should be taken annually through project planning and development. Seasonal samples are important so natural intrastand variance can be defined separately from impact induced changes.

Eleven stations are marked--five on Huntington Creek and six on Eccles Creek. These stations are correlated with UDWR fish sampling

stations, previously sampled macroinvertebrate and sediment stations, and water quality monitoring stations. At each station per specified sample date four macroinvertebrate samples and three sediment samples should be taken. This allows an analysis of variance so data reliability can be documented. This would mean a total of 120 macro and 87 sediment samples would be taken per year during 1979 and 1980. The intensity would be modified after the first two years, unless data evaluation results warranted a continuation.

Table 9 summarizes the stream monitoring program in a two phase approach. Phase I, 1979 and 1980, is designed to meet the O.S.M. regulations concerning permit application, exploration and start-up of actual mining operations--habitat and wildlife resource inventory (section 783.11, 783.20 (a)); submittal of maps with monitoring stations specified (section 783.25 (b); plus protection and enhancement features (section 784.21 (a), (b), 784.23 (b)(8), 817.45, 817.47, 817.57, 817.97); fish and wildlife plan (sections 784.21 (a),(b), 817.97) with methodologies or approaches to minimize disturbances and adverse impacts on fish and wildlife plus enhancement plans, if any.

Phase II deals with impact evaluations during mining operations and reclamation following completion of various project features. Data gathered during preliminary studies, 1979-1980, will provide resource descriptions which will determine the reclamation measures required to restore resources to pre-mining conditions [sections 784.21 (a), (b), 817.57, 817.97]. Changes over the life of the project will be monitored under the less intensive schedule outlined for 1981 on.

Habitat surveys will follow methdologies used by US BLM and

Table 9. Stream resource monitoring schedule. Stations are marked on Figure 1 Map--1-5 on Huntington Creek, 6-12 on Eccles Creek..

1979-1980

Surveys	Stations					
	1979			1980		
	June	August	October	June	August	October
Macroinvertebrates	1, 2, 3, 4, 5, 6, 7, 8, 10, 12	1, 2, 3, 4, 5, 6, 7, 8, 10, 12	1, 2, 3, 4, 5, 6, 7, 8, 10, 12	1, 2, 3, 4, 5, 6, 7, 8, 10, 12	6, 7, 8, 10, 12	1, 2, 3, 4, 5, 6, 7, 8, 10, 12
Fish		1, 2, 3, 6, 7, 9, 10, 11, 12			8, 10, 12	
Sediments	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12	6, 7, 8, 9, 10, 11, 12	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12	6, 7, 8, 9 10, 11, 12	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12
Habitat	1, 2, 3, 6, 7, 9, 10, 11, 12		1, 2, 3, 6, 7, 9, 10, 11, 12	6, 7, 9, 10, 11, 12		6, 7, 9, 10, 11, 12

1981 until completion of facilities, including conveyor system.

	June	August	October
Macroinvertebrate	1, 3, 6, 7, 8, 10, 12	6, 7, 8, 10, 12	1, 3, 6, 7, 8, 10, 12
Fish		1, 2, 3, 9 10, 12	
Sediments	1, 3, 4, 6, 7, 10, 12		1, 3, 4, 6, 7, 10, 12
Habitat*			

*Sampling dates will depend upon construction schedule and extent of habitat modification.

Repeat 1981 effort yearly through active construction and mining period until mine is in full operation and conveyor belt is functional, then every other or every third year until time for reclamation.

USFS fisheries habitat specialists. Measurements will include: stream gradient; channel width (natural and high water); riffle to pool ratios; substrates including spawning gravels; bank stability and gradient; riparian vegetation (type, percent cover, width); water width, depth and velocity at various discharges (Q).

Fish surveys will be conducted by UDWR personnel out of the Price Office. Fish will be shocked out of 0.1 mile long stream reaches. Fish will be measured as to total length and weight and then released. These data can be compared with earlier UDWR collection records, thus illustrating fish population conditions now compared with years past. Eccles Creek has been under heavy use impacts the last few years. The effects on the fishes is not yet known. Huntington Creek above Electric Lake has been closed to fishing the past four years, thus the fish populations should be adjusting to this removal of outside harvest pressures.

Protection and reclamation of Eccles Creek will depend on whether cutthroat trout utilize the entire stream or just the lower portion. The fish survey will address this question. Another question which will be addressed with the proposed surveys is how much water is essential in Eccles Creek to insure trout spawning success. This is critical since the Skyline Project may reduce flows in Eccles Creek.

PROPOSAL FOR
MAMMALIAN ENVIRONMENTAL ASSESSMENT
IN THE
ENVIRONS OF ECCLES CANYON

Submitted to

VAUGHN HANSEN ASSOCIATES

Waterbury Plaza - Suite A

Salt Lake City, Utah

DRAFT

Prepared by

Dr. Clyde L. Pritchett

Brigham Young University

Provo, Utah

23 March 1979

PROPOSAL FOR MAMMALIAN ENVIRONMENTAL ASSESSMENT IN THE ENVIRONS OF ECCLES CANYON

During the winters of 1973, 1974, and 1978 the Utah Division of Wildlife Resources transplanted 43 moose in Fish Creek, west of Scofield Reservoir. Since that time they have dispersed widely. Some of the moose have been reported from Indianola, Sanpete Co., Utah on the south, to Strawberry Valley, Wasatch Co., Utah on the north. Concern has also been expressed about the impact of mining on an apparent elk calving ground near the tops of the mountain west of Slaughterhouse, Eccles, and Green Canyons and on Mule Deer migration routes. If any of these big game animals are using the areas to be pertrubated, the increased activity of construction may drive them out. For purposes of an environmental assessment it is important to know what animals are using these areas and their numbers. The data obtained from these observations may be useful in planning highways through low usage areas.

Three or four trips will be made into the area during the winter to determine if moose are wintering in the canyons near the Skyline Property of Coastal States Energy Company. Observations will include current signs of winter use (based on tracks, vegetation, etc.) and potential plant composition suitable for use by moose throughout the year.

Elk usually calve during May and June. The cows leave the herds and go into the thickets to drop their dappoled calves. We will

have someone in the area two or three days a week during the calving time and at least once a month during the year to observe elk activity.

The impact of the coal mining operation on the Mule Deer population will also be studied. Particular attention will be paid to a potential coal conveyor down Eccles Canyon and its relation to deer migration routes. Observations of the following will be made:

1. Natural deer trails running across the area (particularly Eccles Canyon);
2. The plans for the conveyor and its location to assess the possibility of including under- or overpasses for use by the deer; and
3. The coal conveyor bringing coal from the Deer Creek Mine to Utah Power and Light's plant in Huntington Canyon to note any deer activity around it.

Historically, game animals have been the only mammals that were considered important by the general public. Recently, however, many people have become concerned with the conservation and protection of all wild life. These "non-game" species are now also under the direction of the Division of Wildlife Resources in the State of Utah. As a result of this, in addition to and in conjunction with the survey for elk, deer, and moose, a quantitive inventory be made of all mammals in the environs of fuel deposits to be developed.

To correlate this with ongoing vegetation studies, small mammal trapping grids should be set up in each of the major plant communities. If any threatened or prime species are encountered, we will be aware of them before any perturbation occurs. These data will also give us some indication of the habitat required during the vegetation phase, if necessary, when mining has been completed.

This study will seek to provide the data necessary to fulfill the requirements of the Office of Surface Mining Reclamation and Enforcement (OSM) and the U.S. Forest Service (USFS). The following regulations apply to and will be addressed by this study:

Wildlife and habitat resource inventory	OSM 783.20 (a), USFS p.15 (A8)
Coordination with regulatory agencies	OSM 783.20 (b)
Protection of wildlife and habitat	OSM 784.21 (a), (b)

OUTLINE OF PROPOSED STUDIES OF RAPTORS IN THE SKYLINE PROPERTY AREA FOR COASTAL STATES ENERGY COMPANY

Prepared for

VAUGHN HANSEN ASSOCIATES
Salt Lake City, Utah

DRAFT

By

CLAYTON M. WHITE
Brigham Young University
Provo, Utah

OUTLINE OF PROPOSED STUDIES OF RAPTORS IN THE SKYLINE PROPERTY AREA FOR COASTAL STATES ENERGY COMPANY

INTRODUCTION

The following comments are simply meant to provide information for the sorts of studies that might be useful for the Coastal States Company in order to eliminate problems with environmental organizations who are continually trying to find develop projects in err for not doing adequate environmental assessment work. Earlier work by myself and graduate students on the Manti Laselle National Forest for the U.S. Forest Service have shown some very interesting results. Those studies were done primarily in the Huntington Canyon, Joe's Valley, and Ferron Creek regions. In our earlier survey work there, we found that golden eagles were rather common. And we also found that the habitat looks good for wintering bald eagles. Some reports of bald eagles in the general region have been received. Of interest was the location of a prairie falcon in the Joe's Valley area. A critique of the map of proposed coal development suggests that the Swens-Burnout Canyon area may be very productive for these same species.

The kinds of information that could be gathered are either presence or absence and relative numbers within the area. Much of this data can be gathered from observations made on other surveys throughout the region, although it may be profitable to look at such canyons as James Canyon, Eccles Canyon, and the Kitchen area. A brief trip into the area would suffice in terms of a rather sketchy habitat assessment. A more complete survey would require 2-3 days of effort.

Most important to the coal company is the knowledge of precisely what is there and the numbers in which they exist in order to counter opposition which may develop concerning lack of information of these rather sensitive species. Currently, because of the status allocated to raptors by the U.S. Fish and Wildlife Service and because several are listed on what is called the "blue" list it becomes critical to know more or less the species present and their relative numbers.

Work to derive these data would be minimal and most of the effort could be done primarily in the form of report writing.

STUDY AND OBSERVATION PERIODS

The time frame for observations needs to take place at two different periods, namely winter (early spring) and during the breeding season. Our previous studies for the Forest Service in the Huntington Canyon area suggest that migrants also pass through the area. An assessment of them is not critical since they are highly mobil and not tied to any one area as are winter residents or breeders.

WINTER (EARLY SPRING)

Work on this can be done from existing road systems. Although observations should ideally be made in February/March to find any wintering bald eagles, a survey period in early April may reveal wintering bald eagles. Work will consist simply of observations from a vehicle.

BREEDING (SUMMER PERIOD)

Although several species occupy conifer forests and stream-side vegetation, they are usually common species and not of particular environmental concern. Further, these are species usually difficult to find and can only be found by rather extensive and complete surveys.

However, species of environmental concern, such as golden eagles and prairie falcons, nest on cliff faces. These cliff faces can be easily assessed from vehicles on existing road systems or their locations may be found on aerial photographs and visited on foot. Once again, our experience in the Huntington Canyon area has shown that their populations are not great and that only 1-2 pairs may be expected per canyon. A four day period of observation should reveal any nest.

This study will seek to provide the data necessary to fulfill the requirements of the Office of Surface Mining Reclamation and Enforcement (OSM) and the U.S. Forest Service (USFS). The following regulations apply to and will be addressed by this study:

TASK	REGULATION
Wildlife and habitat resource inventory	OSM 783.20 (a), USFS p. 15 (A8)
Coordination with regulatory agencies	OSM 783.20 (b)
Protection of wildlife and habitat	OSM 784.21 (a), (b)