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MAY 0 3 1982

April 13, 1982

Mr. James W. Smith, Coordinator
Mined Land Development
Division of Oil, Gas, and Mining
Department of Natural Resources
4281 State Office Building
Salt Lake City, Utah 84114

Dear Mr. Smith:

Enclosed is the final Fish & Wildlife Resources Report - Section 10 for the Huntington Canyon No. 4 Mine, Mining and Reclamation Plan. This report replaces the interim report submitted in March 1981 which contained only the data available at that time. This work was performed by Western Resource Development Corporation, Boulder, Colorado.

If you or your staff should have any questions concerning the final Fish & Wildlife Resources Report, please contact Brenda Schladweiler at (303) 575-7943 or myself at (303) 575-7548.

Sincerely,

David R. Chenoweth

David R. Chenoweth
Coordinator
Permits and Compliance

Enclosure

cc: Dick Dawes/OSM
Carbon County Court House

DRC/blh

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OIL, GAS & MINING

Section 10
FISH AND WILDLIFE RESOURCES

10.1 Scope

This report summarizes fish and wildlife studies conducted for Beaver Creek Coal Company (by Wetern Resource Development Corporation) at the Huntington Canyon No. 4 Mine, Emery County, Utah. The purposes of the investigations were to comply with requirements for fish and wildlife studies of mining affected areas for the Utah Division of Oil, Gas, and Mining (DOGM) and to provide Beaver Creek Coal Company with data useful in planning future mining activities and long-term reclamation programs.

In meeting these basic objectives, the fish and wildlife studies were designed to supply the following types of information: (1) species composition and diversity of the various habitat types; (2) seasonal patterns of distribution and relative abundance; (3) habitats or areas of special value to wildlife, such as big game winter range or movement corridors and raptor nest sites; and (4) the actual or potential status of species listed as threatened, endangered, rare, or of particular interest by the Utah Division of Wildlife Resources (DWR) or the U.S. Fish and Wildlife Service (FWS).

Data were obtained during field trips to the study area in early September, early October, and middle November 1980, and late February, late April, late May, late June/early July, and middle August 1981.

10.1.2 Location and Ecological Setting

The Huntington Canyon No. 4 Mine study area is located along the

10.1.2 Location and Ecological Setting (continued)

eastern edge of the Wasatch Plateau in Emery County, Utah. (See Figure 1-2 near the front of the permit application.) Topographically, the study area consists of steep slopes on the face of the plateau and along major drainages, flat surfaces on terraces or floodplains in the valley bottoms, and relatively gentle terrain on top of the plateau (Figure 10-1). The area is underlain by nearly flat-lying sedimentary rocks of the Tertio-Cretaceous North Horn formation and the Lower Tertiary Flagstaff Formation, with Cretaceous Mancos Shale in the lowest portions of the property along the Mill Fork and Little Beaver Creek drainages.

The study area has a highly continental climate, with large daily and seasonal variations in temperature. The lower elevations of the permit area are quite dry, with average annual precipitation of 14 inches or less, mostly falling as spring and late summer rain showers. Higher elevations receive more precipitation, much of it as snow which persists through the winter.

The vegetation of the study area is highly variable, due to differences in elevation and exposure. Major habitats include Mountain Shrub, Mixed Riparian, Aspen, Pinyon/Juniper, Middle Elevation Conifer, and High Elevation Conifer associations. Most of the major habitats are represented by phases with different plant dominants; detailed descriptions of major and minor habitats are presented in Section 10.3.1, below.

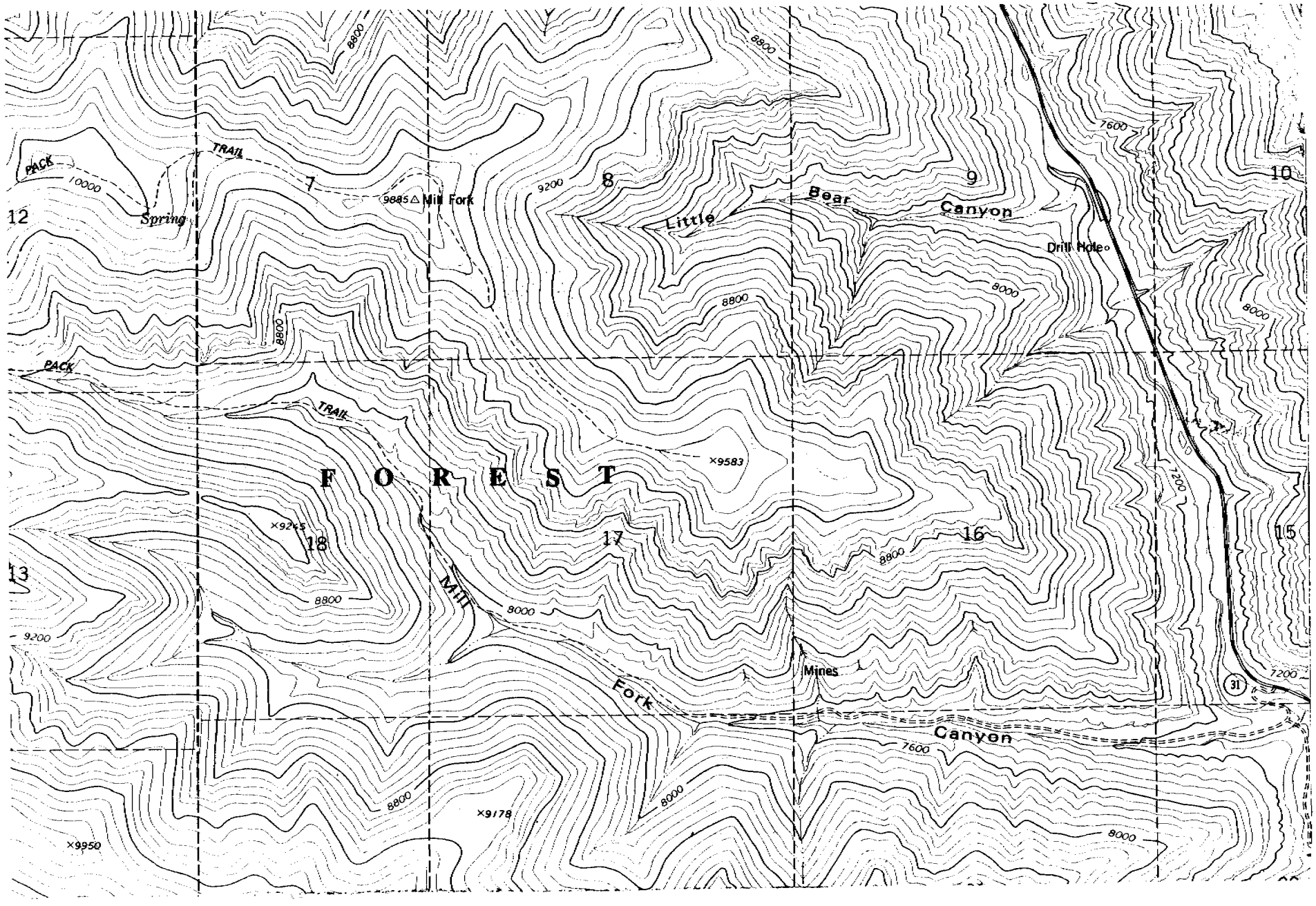

Figure 10-1. The general study area for the Huntington Canyon No. 4 Mining Project, Emery County, Utah. (Source: USGS 7.5' topographic quadrangle map, Rilda Canyon, Utah).

10.2 Methodology

10.2.1 Literature Review

One of the initial steps in the fish and wildlife studies was to review open-file data and range maps available from the DWR Regional Office in Price, Utah. The purpose of this effort was two-fold: first, it provided a regional backdrop of wildlife information; second, it was helpful in identifying areas of concern to DWR and thus ensuring that their needs and preferences were addressed.

The other major purpose of the literature review was to obtain pertinent publications on the distribution and status of vertebrates in the study region (i.e., the Wasatch Plateau). These books, articles, and monographs provided information on species likely to occur in the area and served as a basis for evaluating the representativeness of the Huntington Canyon No. 4 Mine site.

In March 1981, DWR provided detailed wildlife information for the Huntington Canyon No. 4 site, as requested by Beaver Creek Coal Company, pursuant to UMC 783.20. DWR also prepared a wildlife plan representing their recommendations for mitigation and impact avoidance procedures, pursuant to UMC 784.21. The information compiled by DWR in preparing their response to Beaver Creek Coal Company's request comprises a substantial portion of this report, as does DWR's 1978 publication on vertebrate species of southeastern Utah. Specific elements from these DWR documents are cited throughout this report as DWR (1981a), DWR (1981b), and DWR (1978).

10.2.2 Terrestrial Studies

The methods used during field work were designed to provide descriptive and quantitative data for terrestrial wildlife in the mine plan area. Wildlife data collection for the Huntington Canyon No. 4 Mine studies followed a stratified approach based on habitat types. In many instances, wildlife habitats did not strictly coincide with plant communities, being based on topographic as well as vegetational factors. Therefore, some plant community units were combined or split to best reflect wildlife utilization. The correlations between the two are summarized in the description of each habitat type (Section 10.3.1 below).

The methods employed in addressing the various groups of terrestrial vertebrates were discussed informally with Larry Dalton of DWR in Price, Utah, in September 1980, prior to initiating field studies. These methods are summarized in the following sections.

10.2.2.1 Mammals

For the purpose of field study, this diverse group of organisms was divided into large mammals, medium-sized mammals, and small mammals.

Large mammals consist of large herbivores and large carnivores. For the Huntington Canyon No. 4 Mine studies, these species were studied through a combination of systematic transects and opportunistic sightings. Driven surveys along the Huntington Canyon No. 4 Mine access road

10.2.2.1 Mammals (continued)

were used during each field session to obtain data on abundance, distribution, and habitat use; these data were augmented with walked transects across each habitat type. Walked transects afforded an opportunity to evaluate differential habitat uses from indices such as pellet-group densities and percent browse utilization. Opportunistic sightings during other wildlife efforts were particularly useful for species either too uncommon or furtive to be regularly encountered during systematic surveys or restricted to limited habitats. Aerial surveys were initially proposed but were dropped at the request of DWR.

Medium-sized mammals, such as predators, lagomorphs (rabbits and hares), and large rodents were also surveyed by a combination of systematic and opportunistic techniques. Road transects at dawn and dusk were important for predators and lagomorphs, most of which are most active at these times (i.e., "crepuscular"). Data on sign of the crepuscular species and on actual observation of diurnal species were recorded in conjunction with various daytime field efforts.

Small mammals, which may be used as indicators of ecosystem quality and reclamation success, were to have been surveyed using Sherman live-traps set in lines through each habitat type. As with aerial surveys, DWR specified

10.2.2.1 Mammals (continued)

that this technique not be used. Therefore, small mammal information presented in this report is drawn almost exclusively from DWR (1978) and Durrant (1952).

10.2.2.2 Birds

The most efficient grouping of birds for field studies and baseline reports is raptors, upland fowl, waterbirds, and small birds or songbirds.

Raptors were observed and recorded opportunistically throughout the field program. Daytime surveys were best for hawks and eagles, while dawn/dusk surveys resulted in most sightings of owls. In addition, areas of potential importance -- e.g., cliffs, riparian areas, and abandoned buildings -- were specifically searched in an attempt to locate nest sites. Raptor surveys followed the standard survey techniques described by Call (1978).

Upland gamebird surveys were conducted in conjunction with other field programs and relied primarily on chance encounters of the birds or their sign. Special effort was placed on determining if upland fowl breed in the study area or are present in sufficient numbers to offer recreational value.

10.2.2.2 Birds (continued)

Waterbirds (waterfowl, shorebirds, wading birds) were in a similar approach as other large birds — i.e., opportunistically during all field programs plus specific visits to suitable habitats, such as ponds and slow-moving streams. As with upland gamebirds, emphasis was placed on determining the extent to which the study area provided breeding sites and the importance of these species as a recreational resource.

"Small birds" are a heterogeneous group. For the Huntington Canyon No. 4 Mine wildlife studies, this group included perching birds, woodpeckers, humingbirds, swifts, and frogmouths. In late summer, fall, and winter surveys, the presence, distribution, and abundance of small birds was determined along walked transects in each habitat type and by opportunistic sightings during the initial site reconnaissance. During the breeding season (spring and early summer), quantitative data were obtained by counting the number of breeding pairs (territorial males) of each species within numerous plots located systematically along transect routes through each habitat type. Audial identification was emphasized during this census to avoid problems of differential detectability of species (as a function of conspicuousness and activity patterns) and visual penetrability of habitats (e.g., a dense willow thicket versus an open stand of mountain brush).

10.2.2.3 Reptiles and Amphibians (continued)

breeding period, when they could be identified by their vocalizations.

10.2.3 Aquatic Studies

Field and lab methods used in the Huntington Canyon No. 4 Mine aquatic studies were selected to assist Beaver Creek Coal Company environmental staff in describing the biotic and abiotic components of study area streams, discerning possible impacts of the existing mining operation, and recommending future mitigation and monitoring programs. Biotic components specifically included sampling for macroinvertebrates and evaluating the fisheries potential. Abiotic components included field techniques for testing water quality, as well as descriptions of substrate and channel morphology. Studies were conducted in November 1980 and April 1981.

10.2.3.1 Sample Site Selection

Three sample sites were selected in November 1980 to provide data on Mill Fork above, opposite, and below the mining affected area. In the autumn survey, site selection was limited primarily by ice cover. During the spring survey, waterflow as more intermittent, and the original upper and lower sites were dry, thus necessitating their relocation.

The sample site on Little Bear Creek was located in a representative stretch about 300 m above its confluence with Huntington Creek.

10.2.3.2 Habitat Quality

Basic physicochemical characteristics of surface water related to aquatic ecosystem quality were evaluated using standard field equipment during both the fall and spring surveys. In November 1980, temperature and conductivity were measured with a Yellow Springs Model 33 S-C-T meter, hydrogen ion concentration was calculated with an Ace mini-pH meter, and dissolved oxygen was measured by the modified Winkler method. In April 1981, chemical characteristics were determined with a Hach Fish Culturist water chemistry kit, while temperature was measured with a mercury thermometer submersed for at least 5 minutes.

10.2.3.3 Aquatic Invertebrates

Biological community surveys involved use of a 0.5 mm mesh Surber sampler to collect aquatic invertebrates. At each sample site, the substrate was agitated with a 1 ft^2 area to dislodge invertebrates, which were swept by the stream current into a trailing net. Surber samples were collected from at least one pool and one riffle at each site. The combined pool/riffle samples were fixed in the field and returned to the lab for enumeration and identification to the lowest practicable taxonomic level (usually genus). Identification was based on standard reference works for the region (e.g., Baumann et al. 1977, Merritt and Cummins 1978, Pennak 1978).

10.2.3.3 Aquatic Invertebrates (continued)

Nongame fish were to be sampled with a dipnet to determine species composition and relative abundance, but none was observed during either survey.

10.3 Existing Fish and Wildlife Resources

10.3.1 Wildlife Habitats in the Mine Plan Area

Wildlife habitat types were identified and described during the initial field visits to the Huntington Canyon No. 4 Mine site. As described in Section 10.2.2 above, wildlife habitats do not strictly correspond to vegetation community types. In most studies, more wildlife habitats are recognized than are plant communities, because (1) wildlife values generally can be differentiated at the phase (subcommunity) level and (2) some habitats, such as rock outcrops, cliffs, and scree slopes, are not plant-related at all.

Habitats distinguishable at the Huntington Canyon No. 4 Mine Site are described below.

10.3.1.1 Pinyon/Juniper Woodlands

"PJ" haibtats, prevalent on south-facing slopes with rocky substrates of blocky sandstone, were extensive in the study area (see the Vegetation Map, Plate 9-1). Most

10.3.1.1 Pinyon/Juniper Woodlands

Pinyon/Juniper areas were dominated by open stands of Pinyon Pine Pinus edulis, Rocky Mountain Juniper Juniperus scopulorum, and Utah Juniper Juniperus osteosperma, with large Curl-leaf Mountain Mahogany Cercocarpus ledifolius (Figure 10-2). In a few places, the conifers were essentially lacking, resulting in a Mountain Mahogany "woodland." Many of the Mountain Mahogany more closely resembled small trees than shrubs being over 3 m high and having a single large trunk near the ground. Scattered Ponderosa Pine Pinus ponderosa and Douglas-fir Pseudotsuga menziesii were conspicuous in more mesic sites, especially valley bottoms, and Serviceberry Amelanchier sp. was occasionally present in significant numbers.

Prominent PJ understory species included Big Sagebrush Artemisia tridentata, Fringed Sage Artemisia frigida, Broom Snakeweed Xanthocephalum sarothrae, Salina Wildrye Elymus salinus, Indian Ricegrass Oryzopsis hymenoides, Scarlet Globemallow Sphaeralcea coccinea, Scarlet Gillia Ipomopsis aggregata, and Gumweed Tansy-aster Machaeranthera grindelioides.

10.3.1.2 Middle Elevation Conifer Forests

North-facing slopes, such as south of Mill Fork across from the mine site (Figure 10-3), were cloaked in a dense coniferous forest consisting of both low- and high-elevation components. White Fir Abies concolor, Douglas-fir, and

Figure 10-2. Pinyon/Juniper habitat on south-facing slopes along Mill Fork Canyon. Note mine road running diagonally from lower left corner, dense Middle Elevation Conifers in lower right, and Mixed Riparian zone along valley floor.

Figure 10-3. Middle Elevation Conifers on north-facing slope and Mixed Riparian zone in valley, Mill Fork Canyon. Conifers are Douglas-fir and White Fir, deciduous trees are Narrowleaf Cottonwood.

10.3.1.2 Middle Elevation Conifer Forests

Engelmann Spruce Picea engelmannii were codominants of this unit, although it is referred to only as "Douglas-fir" on the Vegetation Map (Plate 9-1). The understory included a variety of shrubs, such as Snowberry Symphoricarpos sp., Currant Ribes sp., Mountain-lover Pachystima myrsinites, Wood's Rose Rosa woodsii. and Oregon Holly-grape Mahonia repens.

Common Juniper Juniperus communis was particularly well developed as a shrub stratum in some sites, especially in exposed areas where the conifer understory was more open. Limber Pine Pinus flexilis and Bristlecone Pine Pinus aristata were also present, generally as scattered individuals along forest edges. These two species occasionally formed a wind-related ecotone between south-facing conifer stands and subalpine dry meadows near steep ridgetops (Figure 10-4).

10.3.1.3 Mixed Riparian Forests

Streamside communities in the permit area -- i.e., along Fork and Little Bear Creek --generally were characterized by typical riparian vegetation (Figure 10-3, Plate 9-1). Prominent tree species were Narrowleaf Cottonwood Populus angustifolia, Quaking Aspen Populus tremuloides, Douglas-fir, White Fir, Engelmann Spruce, and Blue Spruce Picea pungens. Large deciduous shrubs included Thinleaf Alder Alnus tenuifolia, Western River Birch Betula

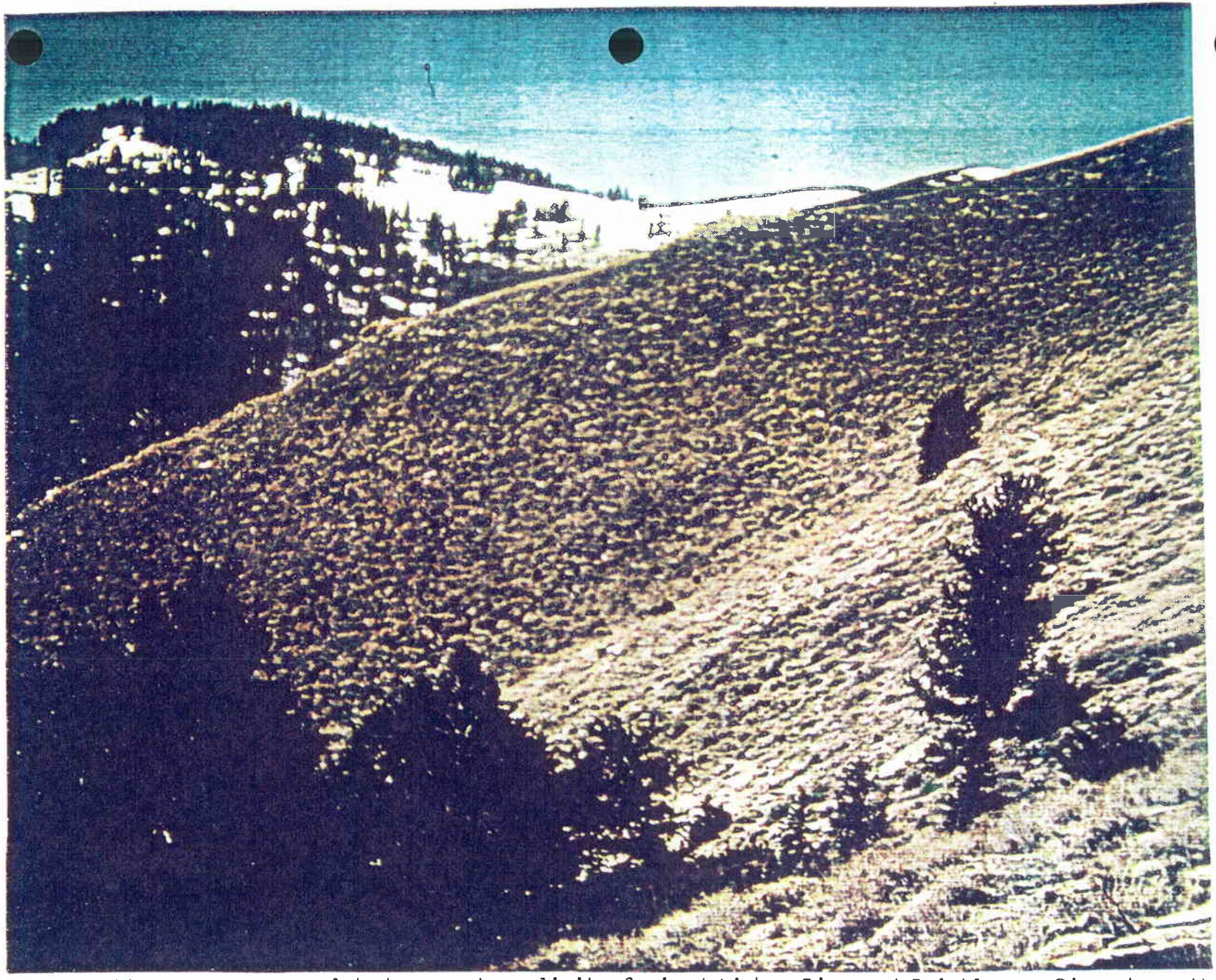

Figure 10-4. Exposure-related upper tree limit of mixed Limber Pine and Bristlecone Pine above the mine site (note absence of snow). Treeless areas are weedy dry meadows and dense sagebrush-snowberry shrub stands, heavily grazed by domestic sheep. Left background is High Elevation Conifer Forest.

10.3.1.3 Mixed Riparian Forests (continued)

occidentalis, Mountain Maple Acer glabrum, Redtwig Dogwood Swida sericea (Cornus stolonifera), Elderberry Sambucus cf. coerulea, Chokecherry Prunus virginiana var. melanocarpa, and a number of willow Salix species.

10.3.1.4 Aspen Forests

Quaking Aspen formed rather extensive stands on top of the plateau west of the permit boundary (i.e., Mill Fork Mountain), especially along drainages. Typical aspen understories included Arnica, Aster, Castilleja, Erigeron, Fragaria, Frasera, Geranium, Heliomeris, Lathyrus, Ligusticum, Lupinus, Osmorhiza, Smilacina, Thalictrum, and Vicia. In a few sites, however, grazing by sheep had apparently been so intense historically that weedy or nonpalatable plants dominated, e.g., Achillea, Cynoglossum, Delphinium, Dugaldia, Hackelia, Helianthus, Lappula, Phacelia, Taraxacum, Tragopogon, and Valeriana. Although shrubs were nearly absent in some places, Snowberry, Oregon Holly-Grape, Wood's Rose, and a variety of other woody species were typical of most aspen stands. Prominent grasses were Mountain Brome Ceratochloa marginata, Nodding Brome Bromopsis cf. porteri, Smooth Brome Bromopsis inermis, Slender Wheatgrass Agropyron

10.3.1.4 Aspen Forests (continued)

trachycaulum, Blue Wildrye Elymus glaucus, Orchardgrass Dactylis glomerata, and Western Needlegrass Stipa occidentalis. Aspen was not mapped as a separate unit on the Vegetation Map (Plate 9-1).

10.3.1.5 High Elevation Conifer Forests

The gentle terrain on top of the plateau supported dense stands of Engelmann Spruce, Subalpine Fir Abies lasiocarpa, and Douglas-fir, with a well developed understory of shrubs and forbs similar to the Middle Elevation Conifer type described above. Small drainages provided suitable sites for additional subalpine forbs, such as Aconitum, Cardamine, Mertensia, Mimulus, and Polemonium. As indicated on the Vegetation Map (Plate 9-1), upper slopes in the Little Bear Canyon area had burned in the past, resulting in open slopes with the charred remains of mature conifers still standing (Figure 10-4).

10.3.1.6 Subalpine Dry Meadows and Sagebrush

Plateau habitats in the permit area included open areas dominated by native and introduced rangeland grasses, weedy forbs (listed under the Aspen habitat description), and in some areas, dense sagebrush and snowberry shrublands. This unit is shown as Sagebrush Grassland on the Vegetation

10.3.1.6 Subalpine Dry Meadows and Sagebrush

Map (Plate 9-1). The distribution of the dry meadows and sagebrush appeared to be controlled in part by exposure, such as on knolls and steep south-facing slopes (Figure 10-5). Most such areas showed evidence of extreme overgrazing by sheep. In a few exposed sites, Common Junipers formed dense, low clumps reminiscent of krummholz at higher elevation tree limits.

10.3.1.7 Aquatic Ecosystems

The two major aquatic habitats within the study area are Mill Fork and Little Bear Creek.

Mill Fork originates on the eastern slope of East Mountain and flows eastward for about 5 mi before joining Huntington Creek. From its point of origin at about 10,120 ft to its terminus at about 7,040 ft, Mill Fork has a mean gradient of approximately600 ft/mi (11.4 percent). Like most small drainages in mountainous terain, it is concave in longitudinal profile, being much steeper near its head than its mouth. The stream is nearly straight, with a meander factor estimated at less than 5 percent.

Although indicated as a perennial stream on the USGS topographic quadrangle map for the area, Mill Fork actually is intermittent overall. In November 1980, the creek had flowing water in only about one-half of its length through

Figure 10-5. Little Bear Canyon in the northeastern portion of the study area, viewed from Huntington Canyon. Note dense Middle Elevation Conifers to the left, open Pinyon/Juniper with scattered Douglas-firs to the right, and Mixed Riparian zone in the foreground. Bare area on ridgeline is a burned conifer stand.

10.3.1.7 Aquatic Ecosystems (cont'd)

the study area (i.e., between its first tributary and its mouth) and was frozen throughout its lowest mile. Where flowing, discharge appeared not to exceed about 0.007 m^3/sec. In April 1981, discharge was even more restricted, with actual flow essentially limited to the stretch between the upper and lower sample sites, a length of about 300 m.

Little Bear Creek is fed primarily by a spring at about 9,000 ft, although snowmelt and precipitation runoff (enhanced by a burn in dense spruce/fir stands near the top of Little Bear Canyon) contribute to peak flows. Throughout its 1.5 mi length, Little Bear Creek is fairly steep, with an average gradient of about 1,200 ft/mi. The essentially permanent flow and greater discharge of Little Bear Creek (about 0.085 m^3/sec) compared to Mill Fork probably are related primarily to the presence of the spring, although slope, aspect, plant cover, and substrate may also contribute to the difference.

10.3.2 WILDLIFE

10.3.2.1 Aquatic Wildlife and Habitat Value Determination

Based on benthic macroinvertebrate and aquatic habitat surveys, and on data provided by DWR (1981a), Mill Fork supports neither game nor nongame (forage) fish and lacks

10.3.2.1 Aquatic Wildlife and Habitat Value Determination (cont'd)

sufficient flow in most years to provide spawning sites. However, the stream probably does contribute some invertebrate food items and a small amount of surface flow to Huntington Creek, an important fisheries in the region. The same is true of Little Bear Creek, which enters Huntington Canyon upstream of Mill Fork.

The greatest value of the Mill Fork and Little Bear Creek aquatic habitats is the water, cover, and food they provide to a variety of terrestrial vertebrates (see the following section).

No fish were seen or collected in either Mill Fork or Little Bear Creek during field studies, nor is a permanent fishery reported by DWR (1981a). The primary reason for the absence of fish from Mill Fork probably is the very low flows observed during both sampling sessions. Although the low flows may have been partly attributable to low precipitation in the region during the 1980-81 study period, examination of the creek channel indicates that the stream seldom carries substantially greater discharge. If fish do occasionally move into lower portions during periods of peak flow, their survival in the creek would be minimal, with movement back into Huntington Creek a more likely scenario.

10.3.2.1 Aquatic Wildlife and Habitat Value Determination (continued)

Little Bear Creek had more flow than Mill Fork (see Section 10.3.1.7), but regular use of the stream by fish probably is precluded by a combination of (1) very steep lower stretches, resulting in a partial barrier to migration from Huntington Creek, and (2) withdrawal of water at the source-spring throughout the summer by the town of Huntington, resulting in very low late summer flows.

Based on benthic macroinvertebrate and aquatic habitat surveys, and on data provided by DWR (1981a), both Mill Fork and Little Bear Creek continues some invertebrate food items and a small amount of surface flow to Huntington Creek, an important fisheries in the region. Although the present study did not permit a quantitative estimate of the percentage of prey-base and water added to Huntington Creek by the two study area streams, the amounts appear to be small. Therefore, the greatest value of the Mill Fork and Little Bear Creek aquatic habitats is the water, cover, and food they provide to a variety of terrestrial vertebrates (see the following section).

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations

As used in this report, "value" incorporates both ecological and economic criteria. Examples of criteria used in

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations (continued)

in evaluating value include considerations such as whether a species is an indicator of environmental stress, critical to the food web as a prey or predator, important for monitoring programs (see Section 10.7 below), or represents a significant hunting or trapping resource. High value habitats are those which support especially high diversities or densities of wildlife, attract species not otherwise found in the area, or are important to high value wildlife species (as defined above).

Both site-specific field studies conducted for Beaver Creek Coal Company and information provided by DWR (1981a) indicate that the most important habitat type in the study area is the Mixed Riparian zone along Mill Fork, Little Bear Creek, and adjacent portions of Huntington Creek. The reasons for classifying Mixed Riparian as the highest priority wildlife habitat are the availability of water and the structural and compositional diversity of the plant community. The second point directly or indirectly affects a number of factors, such as feeding sites, nesting sites, resting or roosting sites, and quantity and quality of fooditems (such as herbage, seeds, fruit, invertebrates, and small vertebrates).

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations (continued)

Other high priority habitats listed by DWR (1981a) are seeps or springs which provide water, and cliffs which afford nesting sites for many species of raptorial birds.

Important and other prevalent wildlife species are discussed in the following sections, which are organized by taxonomic group.

10.3.2.3 Mammals

According to DWR (1978), 84 species of mammals are known to occur in the Wasatch Plateau region, of which 64 are expected to inhabit the study area. Twenty-five mammal species are considered by DWR (1981a) to be of high interest to the State of Utah. These species, and other species prominent in the study area, are described below.

Two bat species of special interest to Utah are the Red Bat Lasiurus borealis, which roosts in wooded areas, and the Western Big-eared Bat Plecotus townsendii, which roosts in caves, rock overhangs, tunnels, or abandoned buildings. See Appendix Table 10-8 for a complete listing of bat species potentially present in the study area.

10.3.2.3 Mammals (continued)

High interest (small game) lagomorphs observed in the study area are the Mountain Cottontail Sylvilagus nuttallii and Snowshoe Hare Lepus americanus. Based on DWR information (1981a), study area provides "substantial" habitat for the cottontail, while the mosaic of spruce/fir, aspen, and riparian zones at the highest elevations provides "high priority" breeding habitat to the hare. Lowest elevation pinyon/juniper habitats may support a few Desert Cottontail Sylvilagus audubonii, which DWR reports to occur below 7,000 ft in most areas (1981a).

One sciurid of high interest to Utah is the Northern Flying Squirrel Glaucomys sabrinus, for which both the Middle Elevation and High Elevation conifer stand-types potentially provide substantial habitat in the study area. Other prominent sciurids observed during field studies, but notclassified as being of special concern to Utah, are the Red Squirrel Tamiasciurus hudsonicus, which was common in mixed conifers; the Rock Squirrel Spermophilus variegatus (often mistaken for a tree squirrel) in Pinyon/Juniper; the

10.3.2.3 Mammals (continued)

Uintah Ground Squirrel S. armatus in dry meadows; the Golden-mantled Ground Squirrel S. lateralis and Uintah Chipmunk Eutamias umbrinus in Pinyon/Juniper and most higher elevation habitats; and the Least Chipmunk E. minimus in virtually every habitat. Sign (burrows) probably belonging to another species -- Northern Pocket Gopher Thomomys talpoides -- were observed in dry meadow and forest clearings above the Huntington Canyon No. 4 Mine study area.

One of the most important groups of terrestrial vertebrates are the small rodents, such as the cricetine and microtine mice, jumping mice, and pocket mice. These species are a vital link in the food web, particularly since they provide the vast bulk of prey for virtually all mammalian and avian predators. Small mammals were not addressed in this study, however, because DWR would not permit a live-trapping sampling program. However, Appendix Table 10-8 provides a list of species expected to occur inthe study area, based on known geographic ranges and ecological preferences.

The Beaver Castor canadensis is a resident of the Wasatch Plateau region, although none was observed in the study area during site-specific field investigations. The apparent absence of Beaver presumably is due to the paucity of

10.3.2.3 Mammals (continued)

flowing streams, with both Mill Fork and Little Bear Creek being too small and intermittent to offer suitable habitat. Muskrat Ondatra zibethicus also inhabit aquatic habitats in the vicinity of the study area, but, like the Beaver, none was observed during field studies, again owing to the scarcity of surface water.

Small carnivores of high interest (as furbearers) to Utah include a number of mustelids: Wolverine Gulo luscus, Badger Taxidea taxus, Marten Martes caurina, Mink Mustela vison, Long-tailed Weasel M. frenata, Short-tailed Weasel M. erminea, Striped Skunk Mephitis mephitis, and Spotted Skunk Spilogale putorius. This group also includes two procyonids, the Raccoon Procyon lotor and the Ringtail Bassariscus astutus.

Based on habitats within the study area, all of these species may occur, although the Raccoon and Mink show a fairly high affinity to surface water and thus are less likely than the other species. Appendix Table 10-8 summarizes the habitat preferences of the small carnivores reported by DWR (1978) as potentially present.

Larger carnivores reportedly present in the region (DWR 1978) are the Black Bear Ursus americanus, Mountain Lion Felis concolor, Bobcat Lynx rufus, Canada Lynx Lynx

10.3.2.3 Mammals (continued)

canadensis, Coyote Canis latrans, Red Fox Vulpus vulpus, and Gray Fox Urocyon cinereoargenteus. Black Bear are known to occur, based on reports by mine personnel and diagnostic sign, and appear to be especially common in wooded valley bottoms. Mountain Lions are likely to occur, with rugged areas along deeper valleys providing the most suitable habitat for denning.

Both the Coyote and Bobcat are known to occur, based on diagnostic sign and direct observation. These species inhabit a broad range of habitats and hence should be considered ubiquitous. Red Fox and Canada Lynx also occupy a variety of habitats, with the fox generally below and the lynx generally above middle elevations in the region. Neither of these species has been observed, nor has the Gray Fox, which tends to occur in low numbers within its range. Another species which theoretically is potentially present in the region is the Gray Wolf Canis lupus (DWR 1981a). However, this species is so rare -- if extant at all -- that it is of interest as an oddity rather than as a critical component of the ecosystem.

10.3.2.3 Mammals (continued)

Of the large predators discussed above, all but the Coyote and Gray Fox are classified as high interest species, based primarily on their value as game species (Black Bear and Mountain Lion), their regional decline (Canada Lynx), or their value in the commercial fur trade.

Large ungulates present on or near the mine permit site are Mule Deer Odocoileus hemionus, American Elk Cervus elaphus, and Moose Alces alces. Deer and elk are common in the region, and overall populations are reported by DWR (1981a) to be increasing for both species. Pre-hunting season aerial trend counts of mule deer in Herd Unit 34 (Table 10-1) indicate an approximate two-fold increase in the deer population from 1973 to 1980 (DWR 1980a). Aerial trend counts of elk in Herd Unit 12 (Table 10-2) indicate a similar increase in populations of that species from 1971 to 1980 (DWR 1980a). It should be emphasized that these numbers represent only trends in population size and are not estimates of population numbers.

Although Mule Deer age ratios (fawns/100 does) indicate a possible steady decline in herd productivity from 1975-1980, age ratios do not necessarily reflect true reproduction and

Table 10-1 Aerial trend counts and herd classification of Mule Deer in Herd Unit 34, (Huntington), Utah, 1973-1980

Year	1973	1974	1975	1976	1977	1978	1979	1980
Aerial Trend Count								
Pre-season	103	213	199	243	318	207	202	235
Post-season	000	000	208	203	273	262	200	227
Herd Classification (post-season)								
Fawns/100 does	000	000	122	108	105	66	78	71
Bucks/100 does	000	000	27	23	19	13	10	4

Table 10-2 Aerial trend counts and herd classification of American Elk in Herd Unit 12, (Mantis), Utah, 1971-1980

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Aerial Trend Count										
Pre-season	550	775	623	906	1269	1283	1278	1291	1106	1459
Herd classification (pre-season)										
Calves/100 cows	54	60	57	55	50	60	55	52	51	56
Bulls/100 cows	24	21	18	12	14	25	20	18	14	12

10.3.2.3 Mammals (continued)

are subject to misinterpretation without additional information, such as rates of increase or annual recruitment of females to the population (Caughley 1974). In general, however, there appears to have been a decrease in deer productivity (fawns/doe) during the past 6 years. The elk herd in Unit 12 shows an upward trend in population and relatively stable production, indicating the presence of a viable herd.

Habitats in the vicinity of the Huntington Canyon No. 4 Mine are mapped by DWR (1981a) as including high priority summer range and crucial-critical winter range for both deer and elk. Summer range for these species is the mosaic of conifers, aspen, and meadows atop the plateau. Although some summer range does occur at higher elevations within the permit area, it is more prevalent on East Mountain to the west and southwest, and Gentry Mountain to the east of Huntington Canyon.

Both the DWR (1980a) and Beaver Creek Coal Company Wildlife consultants have found summer range to be in generally fair to good condition, except for areas of overgrazing by domestic sheep. Within the study, dry meadows have received particularly heavy grazing pressure (see Section 10.3.1.6 above).

10.3.2.3 Mammals (continued)

Summer ranges generally are occupied by deer and elk from middle May through late October, although the exact timing may vary from year to year depending on temperature, snowfall, and range condition. While not a limiting factor to ungulate populations, summer range is important in providing energy reserves to meet deficiencies in winter energy supplies (Klein 1968, Baker and Hobbs 1981).

Winter range for deer and elk includes a variety of slope and vegetation types. Lower slopes throughout much of the study area are mapped by DWR (1981a) as crucial-critical elk winter range (Figure 10-6), based on vegetation types. Most elk winter range in the region occurs farther to the south, primarily in snow-free open areas, such as meadows and wind-swept ridgetops, interspersed with conifers and aspen for cover.

For deer, south- and east-facing slopes along portions of Mill Fork and Little Bear Creek canyons provide relatively warm and snow-free sites, which are especially important during severe winters (Figure 10-7). Xeric slopes within the study area generally support an open conifer woodland with an understory of shrubs and bunchgrasses. On predominantly

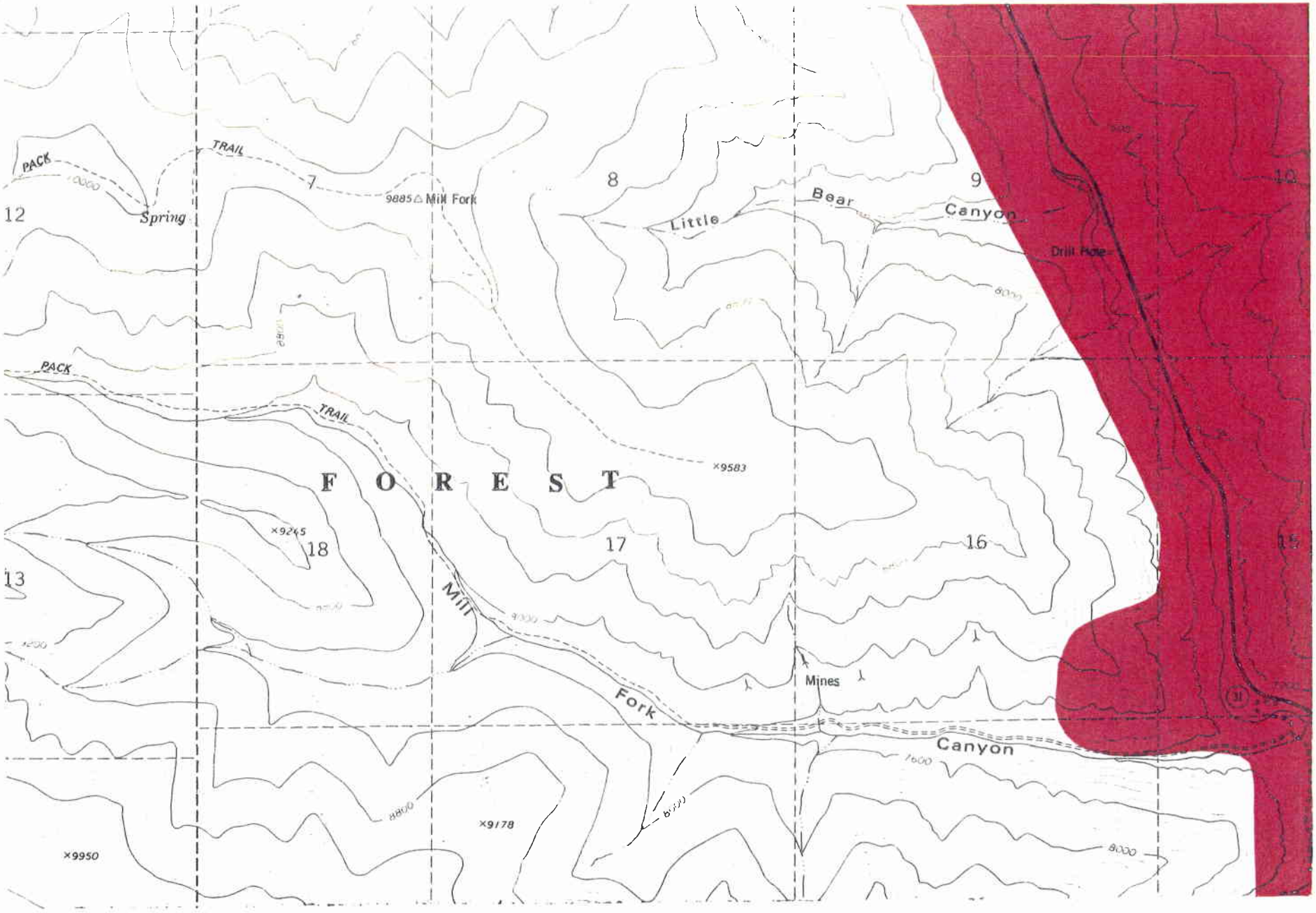

Figure 10-7. Crucial-critical winter range for Mule Deer in the study area (DWR 1981a).

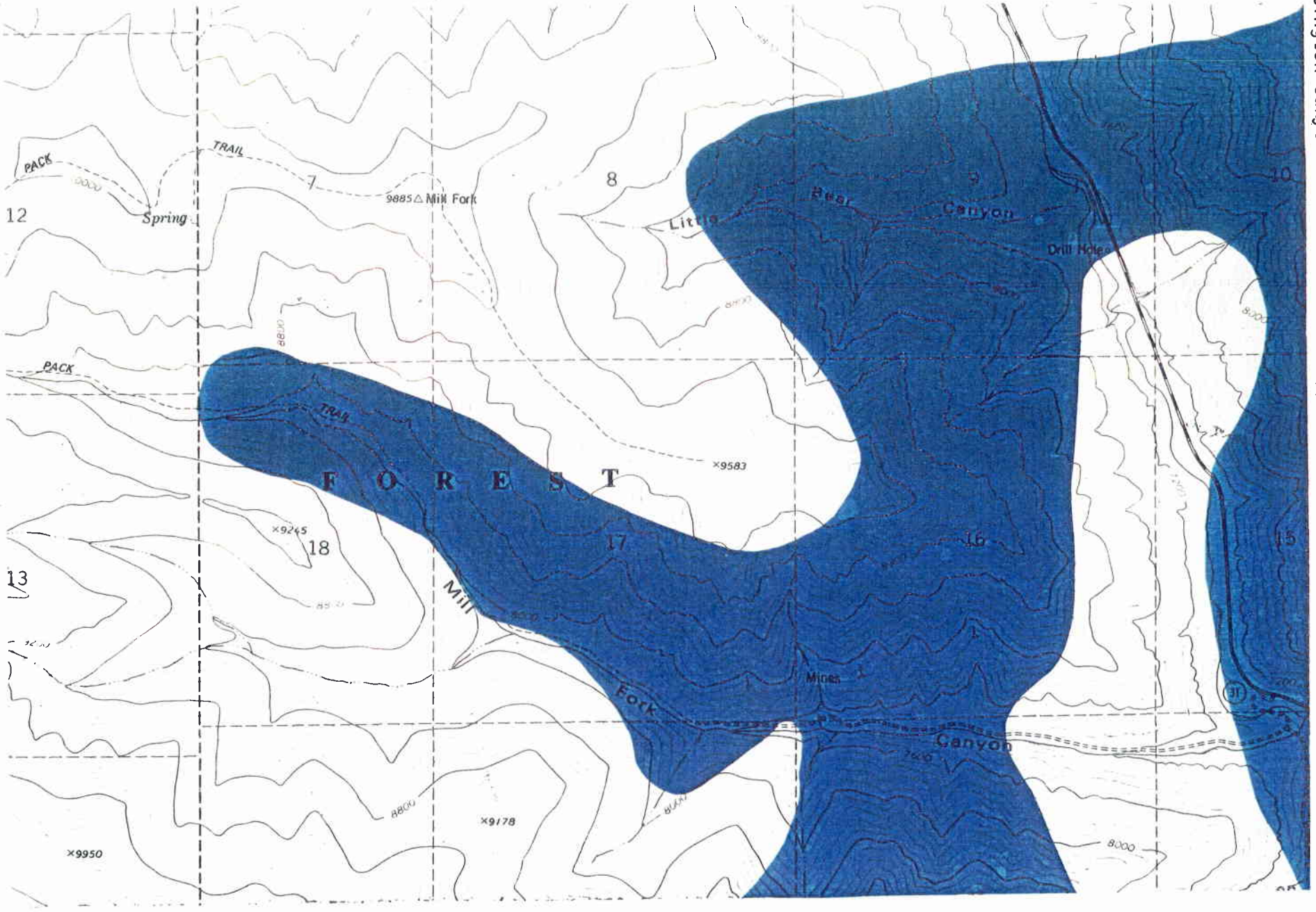

Figure 10-6. Crucial-critical winter range for American Elk in the study area (DWR 1981a).

10.3.2.3 Mammals (continued)

south-facing sites along Mill Fork Canyon, the conifers are dominated by Pinyon Pine, Rocky Mountain Juniper, and Utah Juniper, with scattered Ponderosa Pine and Douglas-fir (Figure 10-2). On east-facing sites along the west side of Huntington Canyon and lower Little Bear Canyon, the conifer stratum includes a more significant Douglas-fir component (Figure 10-5), probably due to aspect and a somewhat higher mean elevation.

Other important elements in winter range are riparian zones, which provide water, cover, and an abundance of browse, and north-facing slopes, which provide both hiding and thermal cover (Thomas 1979, Carpenter and Regelin 1981). Winter use by deer and elk of north-slope Middle Elevation conifers probably varies, depending on temperature and snow accumulation under the trees.

Deer pellet-group counts were conducted in the three major winter range habitat types to obtain an index of habitat preference (Robel et al. 1970). Habitat preference indices were calculated by dividing the percent frequency of sample plots containing deer pellet groups by the percentage of area coverd by each habitat within the permit area (Table 10-3). The Mixed Riparian habitat type appeared to be highly preferred over both the Middle Elevation Conifer and Pinyon/Juniper habitat types. The close juxtaposition of

Table 10-3 Big game winter range habitat preference indices for the Huntington Canyon No. 4 Mine, Emery County, Utah (1980-1981).

Habitat	Percent Habitat*	Percent of Plots With Sign	Habitat Preference Index
Pinyon/Juniper	80	50	0.67
Middle Elevation Conifer	15	70	4.7
Mixed Riparian	5	60	12.0

*Estimated winter range for permit area.

10.3.2.3 Mammals (continued)

the riparian and coniferous forest types makes these areas particularly attractive, due to the availability of both browse and thermal cover. The relatively high preference index for the Middle Elevation Conifer type probably is a proximity effect created by the adjacent riparian zone. Although field data suggested that Pinyon/Juniper was the least preferred, its importance as part of the total winter range should not be underestimated. As previously stated, south-facing slopes may be important when deer and elk are forced to seek open feeding areas during severe winters. (Note: The 1980-1981 winter during which field studies were conducted was unusually mild and snow-free, thus probably skewing survey results toward areas of thermal cover compared to more typical years.)

Elk calving and deer fawning occurs in the Wasatch Plateau region in late May and June. Although no specific sites have been identified in the study area by DWR (1980a, 1981a) or Beaver Creek Coal Company wildlife consultants, all riparian zones and other mesic habitat types are considered potential calving and fawning grounds. However, the large riparian belt along Huntington Creek probably is not utilized, owing to the proximity of State Highway 31. Similarly, the riparian area along Mill Fork opposite the Huntington Canyon No. 4 Mine probably receives little use

10.3.2.3 Mammals (continued)

during the critical parturition period because of mining activities and traffic on the access/coal haulage road. Upper reaches of Mill Fork Canyon, aspen-conifer-meadow mosaics on top of the plateau, and Little Bear Canyon are likely fawning and calving areas, based on habitat characteristics and the proximity of both winter and summer range.

Moose occur in the Wasatch Plateau, as a result of six transplants -- totalling 43 animals --during the winters of 1973, 1974, and 1978. Ten sightings were reported by DWR (1980a) between May 1973 and February 1978; the observations closest to the study area were in Crandall Canyon 4 km to the north and on Gentry Mountain 4 km to the east. DWR (1981a) reports that a portion of the study area provides Moose winter range, but field studies indicate that preferred habitat is quite limited. The Mill Fork and Little Bear Creek riparian zones are the most likely sites for Moose within the study area.

Because of DWR's unwillingness to permit aerial surveys, the topographic reliefs of the site, and poor access to most of the area by roads, it was not possible to estimate the populations of big game during the 1980-1981 field study. Even where populations estimates are possible, however, they are of limited value, for two major reasons. First, the

10.3.2.3 Mammals (continued)

animals have such large daily and seasonal ranges that periodic censuses do not accurately indicate the number of animals using a given area -- either on any one day or throughout the year. Second, the variable affecting population size and distribution are so numerous that estimating the herd size tells little about the influence of a single factor (such as the operation of a coal mine).

10.3.2.4 Birds

Approximately 140 species of birds are potentially present in the study area during at least part of the year (Table 10-9), of which 29 are listed by DWR (1981a) as being of high state interest. These species, which include game-birds and raptors, are discussed below, as are prominent small birds observed or expected in the study area.

Gamebirds include waterfowl, upland fowl (gallinaceous birds), and doves. Waterfowl do not provide a significant recreational resource in the study area because of the limited surface water. However, small wetgrass areas atop the plateau west of the property may receive occasional seasonal use by puddle ducks, such as Green-winged Teal Anas crecca and Mallard A. platyrhynchos.

Upland fowl potentially provide a more important recreation resource, with DWR (1981) reporting both the Blue Grouse

10.3.2.4 Birds (continued)

Dendragapus obscurus and Ruffed Grouse Bonasa umbellus as yearlong inhabitants of the study area. Blue Grouse concentrate in open stands of spruce and fir during the winter, where they feed on needles and buds. Thus, both middle and high elevation conifer forests provide potential "crucial-critical" winter range (DWR 1981a). Other habitat types occupied by this species include low elevation pinyon/juniper and mountain shrubland in the spring and high elevation conifer-aspen-meadow mosaic in summer and fall. Blue Grouse were not observed during field studies in the study area, but booming males were heard along slopes adjacent to Mill Fork west of the site in spring 1981.

Ruffed Grouse occupy a fairly broad range of habitats, especially aspen and mountain shrubland, although conifers often are used during the winter. DWR (1981a) reports that deciduous zones within 0.25 mi of a stream provide "high priority" habitat for Ruffed Grouse overall, while aspen forests afford "crucial-critical" habitat during the mid-winter period (the birds apparently rely on aspen staminate buds as a winter food source). Ruffed Grouse were not observed during site-specific field studies.

10.3.2.4 Birds (continued)

Other gamebirds in the region are the Band-tailed Pigeon Columba fasciata and Mourning Dove Zenaida macroura. The pigeon is uncommon in the Wasatch Plateau, usually occurring as isolated stragglers or small flocks at irregular intervals in spruce/fir habitats (DWR 1981a). The dove is a much more likely inhabitant of the region, with pinyon/juniper and riparian habitats potentially providing high priority nesting habitat. It should be noted, however, that site-specific field studies indicate a fairly low abundance of Mourning Doves in the study area, perhaps partially due to the scarcity of reliable surface water. From this standpoint, seeps and springs on the south-facing pinyon/juniper slope above the Huntington Canyon No. 4 Mine may be particularly important to doves -- but not in large numbers.

Raptors observed by wildlife consultants are the Golden Eagle Aquila chrysaetos, Red-tailed Hawk Buteo jamaicensis, Goshawk Accipiter gentilis, Sharp-shinned Hawk A. striatus, American Kestrel Falco sparverius, and Great Horned Owl Bubo virginiana. In addition, mine personnel reported seeing Screech Owl Otus asio along the MillFork mixed riparian zone. All of these species are likely

10.3.2.4 Birds (continued)

to breed in or near the permit area, based on habitats available, observations during the nesting season.

Redtails frequently were seen soaring along the ridge above the mine, probably hunting in the open PJ and Sagebrush Grassland habitat types. No nest was located, but aggresive behavior by an adult Redtail in late June 1981 indicated a probable nest site in dense conifers across Mill Fork Canyon from the mine.

Adult Sharpshinned Hawks were routinely encountered in the riparian zone and adjacent north-facing conifers in lower Mill Fork Canyon. Adult Kestrels (one male, one female) were generally seen in the same area, except across the stream in more open south-facing habitats. Typical nesting habitat for the Sharpshinned consists of deciduous or coniferous trees and brusah, while Kestrels more often prefer cliff sites. Both of these habitats occur along Mill Fork Canyon, and it therefore seems likely that these two species bred in the study area.

Great Horned Owls probably are fairly common, but owls are easily overlooked, and only one bird was actually observed. Its presence in appropriate habitats (riparian forest) in the breeding season (late April) suggests that the Great Horned Owl is a breeding resident.

10.3.2.4 Birds (continued)

Goshawks were observed only in higher elevation conifer-meadow mosaics west of the permit area. Only one Golden Eagle was seen --an adult gliding from west to east along the ridgetops above the mine in late April. Goshawks generally nest in large aspen or conifers, while Golden Eagles prefer cliff sites, such as available along Huntington Canyon.

Figure 10-8 shows areas of heaviest raptor use, including probable nesting areas.

During a separate raptor survey conducted for Beaver Creek Coal Company in the nesting season (Springer and Truettt 1980), six inactive stick nests were found in the study area. Of these, four were dilapidated, one appeared to have been used in 1979, and one had been improved in 1980 but was not used. All of the nests were on cliffs on the north side of Mill Fork Canyon. Based on the size of ther nests, Springer and Truett (1980) judged that they were too small for Golden Eagles and instead had been used by Red-tailed Hawks, Great Horned Owls, and/or Common Ravens Corvus corax.

DWR (1981a) classifies the study area as "substantial" habitat for these species, as well as for others potentially present but not observed (Appendix Table 10-9). U.S. Fish and Wildlife Service raptor specialists Ron Joseph and Bruce Waddell

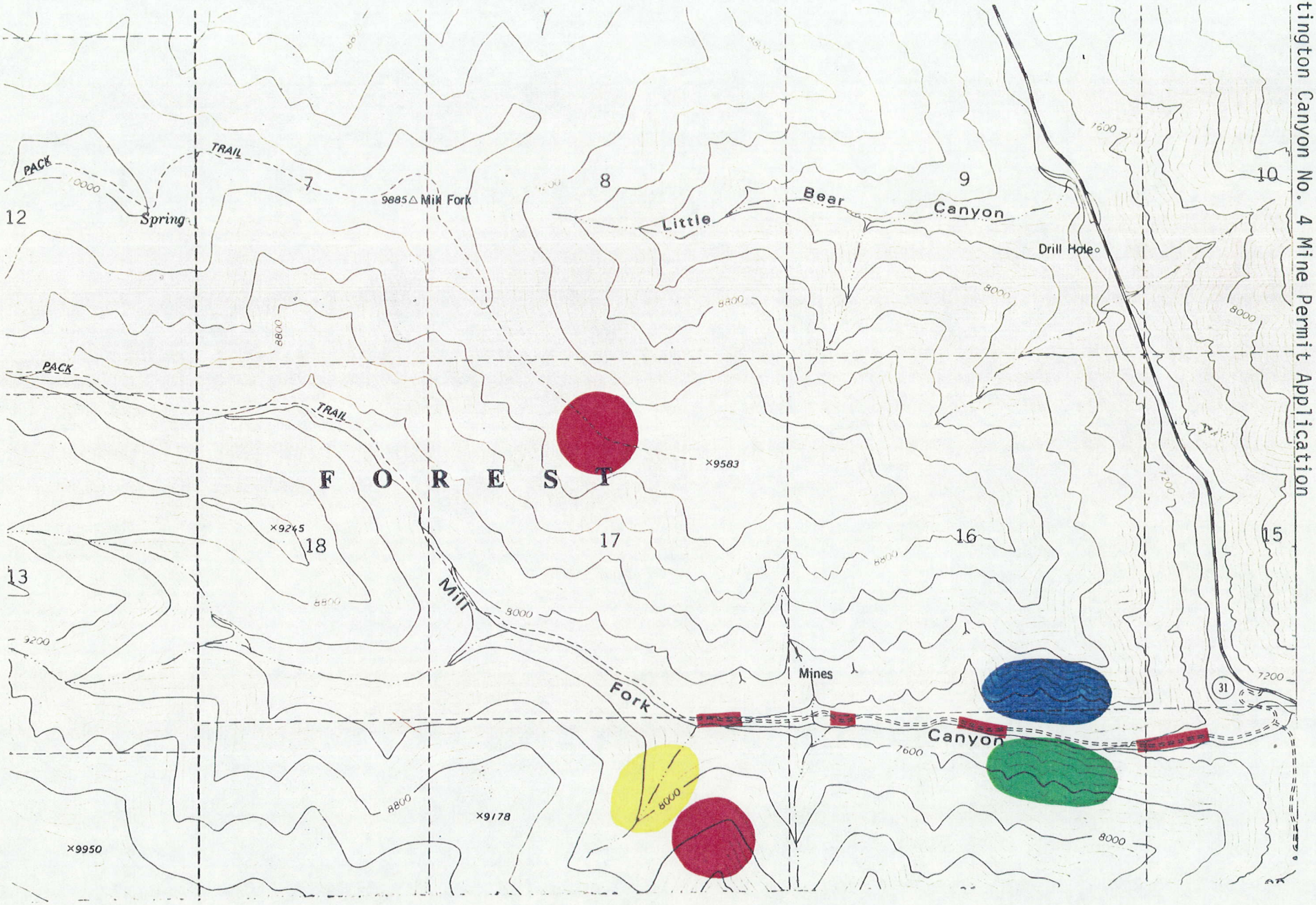

Figure 10-8. Areas of frequent occurrence, and hence possible breeding, by Red-tailed Hawks (red), Sharp-shinned Hawks (green), American Kestrels (blue), and Great Horned Owls (yellow) in the study area, 1981. Red strips along the Mill Fork road represent areas of frequent deer

10.3.2.4 Birds (continued)

visited the study area in August 1981, during which they confirmed that, while the cliffs along Mill Fork provide suitable nest sites, the general area lacks sufficient hunting habitat for intensive use by eagles, large falcons, and most buteos.

Raptors are of particular concern to DWR for three principal reasons. First, they are predators on small mammals and hence important in maintaining ecosystem balance.

Second, because they are high-order predators and have large home ranges, they are valuable indicators of environmental stress, sensitive to disturbance from rather far-removed activities, and consequently logical keystone species in ongoing monitoring programs. Third, the public at large is interested in raptors and therefore exerts considerable pressure for their protection.

Although public and regulatory concern is focused on gamebirds and raptors, small birds comprise the vast majority of species and avian biomass present in virtually any ecosystem. Approximately 125 species of small birds are potentially present in the study area (Appendix Table 10-9),

10.3.2.4 Birds (continued)

including cuckoos, frogmouths, swifts, hummingbirds, flycatchers, and songbirds.

Aspen Forests provide habitat for the largest number of small birds, particularly hole-nesting species for which aspen are especially attractive owing to their soft wood. Typical breeding species include the Common Flicker Colaptes auratus, Hairy Woodpecker Picoides villosus, Downy Woodpecker P. pubescens, Yellow-bellied (Red-naped) Sapsucker Sphyrapicus varius nuchalis, Western Wood Pewee Contopus sordidulus, Western Flycatcher Empidonax difficilis, Dusky Flycatcher E. oberholseri, Violet-green Swallow Tachycineta thalassina, Tree Swallow Iridoprocnebicolor, Black-capped Chickadee Parus atricapillus, Mountain Chickadee P. gambeli, White-breasted Nuthatch Sitta carolinensis, House Wren Troglodytes aedon, American Robin Turdus migratorius, Mountain Bluebird Sialia currucoides, Townsend's Solitaire Myadestes townsendii, Warbling Vireo Vireo gilvus, Yellow-rumped Warbler Dendroica cornoata, and Gray-headed Junco Junco caniceps. Coniferous Forest habitats supported almost as many small bird species, with regular breeding inhabitants including the Hairy Woodpecker, Olive-sided Flycatcher Nuttallornis borealis, Hammond's Flycatcher Empidonax hammondii, Steller's Jay Cyanocitta stelleri,

10.3.2.4 Birds (continued)

Clark's Nutcracker Nucifraga columbiana (at higher elevations Mountain Chickadee, Red-breasted Nuthatch Sitta canadensis, Pygmy Nuthatch S. pygmaea (at lower elevations), Ruby-crowned Kinglet Regulus calendula, Solitary Vireo Vireo solitarius (at lower elevations), Yellow-rumped Warbler, Western Tanager Piranga ludoviciana, Gray-headed Junco, Chipping Sparrow Spizella passerina, Red Crossbill Loxia curvirostra, and Pine Siskin Carduelis pinus.

Mixed Riparian zones included many elements of both the aspen and conifer stands described above, plus a number ofspecies endemic to the tall mesic shrubs or the mixture of tall shrubs, conifers, and deciduous trees. Essentially endemic species were the Willow Flycatcher Empidonax traillii, Gray Catbird Dumetella carolinensis, Swainson's Thrush Catharus ustulatus, Orange crowned Warbler Vermivora celata, Yellow Warbler Dendroica petechia, MacGillivray's Warbler Oporornis tolmiei, Wilson's Warbler Wilsonia pusilla, Black-headed Grosbeak Pheucticus melanocephalus, Rufous-sided Towhee Pipilo erythrophthalmus, and Song Sparrow Melospiza melodia. Especially common birds from the aspen and conifer habitats included the Downy Woodpecker, Yellow-bellied Sapsucker, Western Flycatcher, American Robin, Townsend's

10.3.2.4 Birds (continued)

Solitaire, Mountain and Black-capped Chickadees, House Wren, Warbling Vireo, Yellow-rumped Warbler, and Western Tanager.

Pinyon/Juniper stands, which form the vegetational cover throughout most of the mine affected area, had a relatively depauperate avifauna compared to the more mesic types -- but typical of PJ stands in the region. Endemic species in this habitat type were the Pinyon Jay Gymnorhinus cyanocephalus, Plain Titmouse Parus inornatus, Rock Wren Salpinctes obsoletus, Blue-gray Gnatcatcher Polioptilacaerulea, Black-throated Gray Warbler Dendroica nigrescens, and Green-tailed Towhee Pipilo chlorura.

Tables 10-4 and 10-5 summarize plot surveys during the peak of the small bird breeding season in May 1981. Quantitative data were collected only for the Pinyon/Juniper and Mixed Riparian habitat types because other units are poorly represented in or adjacent to the affected area and the amount of data would therefore be too limited for reliability.

Although densities are reported as number of territorial males per hectare, plots censused actually were smaller. For the linear riparian zone plots were 100 m by 30 m (0.3

Table 10-4 Small bird breeding data, Mixed Riparian habitat type, Huntington Canyon No. 4 Mine, Emery County, Utah, May 1981.

Species	Density[1]	Frequency[2]	Relative[3] Abundance
Warbing Vireo	2.9	86	13.8
Yellow-rumped Warbler	2.4	50	11.4
Western Tanager	2.4	50	11.4
Hermit Thrush	1.4	42	6.7
Ruby-crowned Kinglet	1.4	42	6.7
House Wren	1.2	36	5.7
Hammond's Flycatcher	1.0	36	5.7
Western Flycatcher	1.0	28	4.8
Steller's Jay	1.0	28	4.8
Brown Creeper	0.7	21	3.3
Townsend's Solitaire	0.7	21	3.3
Orange-crowned Warbler	0.7	21	3.3
Wilson's Warbler	0.7	21	3.3
Chipping Sparrow	0.7	21	3.3
Willow Flycatcher	0.5	14	2.4
Mountain Chickadee	0.5	14	2.4
Black-capped Chickadee	0.5	14	2.4
Gray Catbird	0.5	14	2.4
American Robin	0.2	7	1.0
MacGillivray's Warbler	0.2	7	1.0
Pine Siskin	0.2	7	1.0
Total	21.0		100.0

[1]Number of breeding pairs (inferred from singing males) per hectare, n=14. Plot size = 100 m by 30 m.

[2]Percent of total plots in which each species occurred.

[3]Percent of total bird observations comprised by each species.

Table 10-5 Small bird breeding data, Pinyon/Juniper habitat type, Huntington Canyon No. 4 Mine, Emery County, Utah May 1981.

Species	Density[1]	Frequency[2]	Relative[3] Abundance
Solitary Vireo	0.6	30	13.0
Green-tailed Towhee	0.6	30	13.0
Dusky Flycatcher	0.5	25	10.9
Mountain Chickadee	0.5	25	10.9
Western Tanager	0.4	20	8.7
Yellow-rumped Warbler	0.4	20	8.7
American Robin	0.3	15	6.5
Ash-throated Flycatcher	0.2	10	4.3
Blue-gray Gnatcatcher	0.2	10	4.3
Rock Wren	0.2	10	4.3
Black-throated Gray Warbler	0.2	10	4.3
Chipping Sparrow	0.2	10	4.3
Plain Titmouse	0.1	5	2.2
Canyon Wren	0.1	5	2.2
Mountain Bluebird	0.1	5	2.2
Total	4.6		99.8

[1]Number of breeding pairs (inferred from singing males) per hectare, n = 20. Plot size = 100 m by 50 m.

[2]Percent of total plots in which each species occurred.

[3]Percent of total bird observations comprised by each species.

10.3.2.4 Birds (continued)

ha); for the steep PJ habitats, plots were 50 m by 100 m (0.5 ha). Additional data reported in the tables are frequency (the percentage of total plots in which each species occurred) and relative abundance (the percentage of total bird observations which each species comprises).

As can be seen from the two tables, the Mixed Riparian habitat type had both a high total density (21.0/ha), attributable to the diversity of nesting and foraging sites, and a large number of species (21). By contrast, the Pinyon/Juniper type, which comprises by far the greatest portion of the affected area, supported only fifteen species and 4.6 breeding pairs per hectare within the sample plots.

Winter residents included many of the breeding species listed above, plus large influxes of White-crowned Sparrows Zonotrichia leucophrys and Dark-eyed Juncos Junco hyemalis in virtually every habitat type. Appendix Table 10-9 provides additional information on species actually or potentially occurring in the study area.

No cold-blooded terrestrial vertebrates were observed during site-specific field studies, but three groups of species are expected in the study area. Xeric Sites, especially at lower elevations, provide habitat for several lizards and snakes, with the Collared Lizard Crotaphytus collaris, Fence

10.3.2.5 Reptiles and Amphibians

Lizard Sceloporus undulatus, Tree Lizard Urosaurus ornatus, Striped Whipsnake Masticophis taeniatus, and Racer Coluber constrictor most likely to be present in significant numbers. Mesic Sites, especially at higher elevations, probably are inhabited by a few snakes, most notably the Bullsnake Pituophis melanoleucus and Western Terrestrial Garter Snake Thamnophis elegans. Aquatic Sites, including ponds and wet meadows, could be utilized for breeding by amphibians such as the Tiger Salamander Ambystoma tigrinum, Western Toad Bufo boreas, and Western Chorus Frog Pseudacris triseriata. As noted in other sections of this report, however, surface water is limited in the study area, and habitat for amphibians is marginal at best.

Appendix Table 10-10 provides a complete list of herptiles in the Wasatch Plateau region and potentially present in the study area.

10.3.2.6 Aquatic Organisms

No fish were seen or collected in either Mill Fork or Little Bear Creek, and it is doubtful that fish could survive either of these small streams, although individuals may move a short distance into both during periods of peak runoff. However, this occurrence would be transitory because the fish would migrate back to Huntington Creek as water levels receded.

10.3.2.6 Aquatic Organisms (continued)

The benthic macroinvertebrate community of Mill Fork was surveyed in November 1980 and April 1981 at stations above (MF-1), opposite (MF-2), and below (MF-3) the existing Huntington Canyon No. 4 Mine. The results of these surveys, and coincident water quality and habitat quality evaluations, are summarized in the following subsections.

Site MF-1 was located during the fall survey at the confluence of Mill Fork and an unnamed tributary about 460 m upstream of the western permit area boundary. This stretch of the stream consisted of several small pools connected by riffles. Mean pool depth was 18 cm, mean riffle depth was 4 cm and stream width was 1.5 m, or less. Rubble and gravel were the primary substrate components of riffles, while pools contained a mixture of rubble, gravel, sand, and silt as well as deciduous leaf packs were in the pools. Mean water velocity of the riffles was about 15 cm/sec. Spruce and fir along the creek provided a dense canopy and the stream banks were retained by grasses.

Eighteen aquatic invertebrate taxa were captured in two Surber samples. The midge Chironomidae was the abundant organism (50 percent) but oligochaetes, young stonefly instars, the stonflies Malenka and Pteronarcella badia, the caddisfly Hesperophylax, and the flies Atherix variegata and Simuliidae were moderately common (Table 10-6). The water was moderately alkaline, and dissolved oxygen was 10.1 mg/l. Water temperature was 1.0 C (Table 10-7).

Table 10-6 Aquatic invertebrates collected from Mill Fork Creek, 18 November 1980 and 26-27 April 1981, and Little Bear Creek, 27 April 1981, Emery County, Utah.

Organism	Site[1] MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Turbellaria					4	2.8								
Tricladia														
Planariidae														
Polycelis coronata			59	6.6			1	4.2						
Nematoda					1	0.7								
Oligochaete	52	10.6	2	0.2	30	21.3	2	8.3	2	1.5			18	6.5
Ostracoda	3	0.6	52	5.8					1	0.8				
Copepoda			1	0.1										
Hydracarina									1	0.8				
Insecta														
Plecoptera														
Young instars	47	9.6			15	10.6								
Nemouridae											24	32.9		
Malenka sp.	18	3.7							10	7.6				
Perlodidae														
Isoperla sp.									18	13.6	1	1.4	1	0.9

[1]The sites are those above, opposite, and below the Huntington Canyon No. 4 Mine on Mill Fork (MF-1, MF-2, and MF-3, respectively) in both 1980 and 1981, and on Little Bear Creek (LB-1) in 1981. Values reported are total numbers per taxon per site (#) and percent relative abundance (%).

Table 10-6 (cont.)

Organism	Sites MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Pteronarcidae														
Pteronarcella badia	47	9.6	1	0.1	15	10.6								
Ephemeroptera														
Baetidae														
Baetis sp.	8	1.6					2	8.3	46	34.8	3	4.1	49	45.0
Siphlonuridae														
Ameletus sp.	3	0.6	31	3.4	17	12.1	3	12.5	10	7.6	1	1.4		
Ephemerellidae														
Ephemerella sp.			6	0.7	1	0.7					1	1.4		
Ephemerella grandis	1	0.2							1	0.8				
Ephemella doddsi					1	0.7								
Heptageniidae														
Heptagenia sp.	3	0.6			19	13.5			8	6.1				
Epeorus sp.							1	4.2			4	5.5	1	0.9
Cinygmula sp.			23	2.6			6	25.0					5	4.6
Hemiptera														
Hebridae														
Hebrus sp.	1	0.2												
Trichoptera														
Polycentropodidae							1	4.2						
Limnephilidae														
Hesperophylax sp.	22	4.5	33	3.7	15	10.6	3	12.5	11	8.3	2	2.7	4	3.7
Rhyacophilidae														
Rhyacophila sp.			1	0.1					1	0.8			2	1.8
Hydropsychidae														
Hydropsyche sp.									1	0.8				

Table 10-6 (cont.)

Organism	Sites MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Diptera														
Empididae							1	4.2	1	0.8				
Chironomidae	247	50.3	660	73.4	15	10.6	3	12.5	5	3.8	30	41.1	17	15.6
Ceratopogonidae			6	0.7	3	2.1					1	1.4	1	0.9
Tipulidae														
Tipula sp.	3	0.6			1	0.7			3	2.3				
Helius sp. or Ormosia sp.					1	0.7								
Ormosia sp.			22	2.4										
Dicranota sp.			2	0.2							4	5.5	4	3.7
Hexatoma sp.									2	1.5	2	2.7	5	4.6
Dixidae														
Dixa sp.	1	0.2							1	0.8				
Athericidae														
Atherix variegata	16	3.3			1	0.7			10	7.6				
Anthiomyidae														
Limnophora aequifrons	2	0.4			1	0.7								
Simuliidae	15	3.1			1	0.7								
Gastropoda														
Planorbidae (old shells)	2	0.4												
Gyraulus sp.							1	4.2						
Pelecypoda														
Sphaeriidae														
Total Number Taxa	**18**		**14**		**17**		**11**		**18**		**11**		**12**	
Total Number Organisms	**491**		**899**		**141**		**24**		**132**		**73**		**109**	

Table 10-7 Physicochemical water characteristics of sampling sites on Mill Fork, 17 november 1980, and 26-27 April 1981, and Little Bear Creek, 27 April 1981, Emery County, Utah.

Parameter	Sites[1] MF-1(80)	MF-1(81)	MF-2(80)	MF-2(81)	MF-3(80)	MF-3(81)	LB-1 (81)
Dissolved Oxygen (mg/l)	10.1	6.8	5.8	8.0	10.2	7.3	7.6
Alkalinity (mg/l)	----	----	----	291.0	----	308.2	256.8
Hardness (mg/l)	----	428.0	----	359.5	----	513.6	393.8
pH	8.4	7.8	7.3	8.5	7.4	8.5	8.6
Conductivity (micro mhos/cm)	310	----	415	----	310	----	----
Temperature (C)	1.0	4.0	4.0	3.5	0.9	5.5	5.0

[1]The sites are those above, opposite, and below the Huntington Creek No. 4 Mine on Mill Fork (MF-1, MF-2, and MF-3, respectively) in both 1980 and 1981, and on Little Bear Creek (LB-1) in 1981.

10.3.2.6 Aquatic Organisms (continued)

Lack of surface flows at Site MF-1 during the following spring survey necessitated relocating the site about 0.9 km downstream. In this area the stream consisted of one pool (about 3 m by 5 m by 30 cm deep) and a shallow riffle-run (about 5 cm deep) below the pool. The small rubble and sand substrate of the creek was overlain with fine sediments, most likely dust and eroded soils from the adjacent access road. Several culverts directed run-off from the road to the stram. Riparian vegetation provided a fairly dense canopy over the creek, and the stream contained leaf litter and small limbs.

The Surber samples taken from the pool and riffle-run contained fourteen taxa. The midge Chironomidae was the most common aquatic invertebrate (73.4 percent). The planarian Polycelis coronata, the mayflies Ameletus and Cinygmula, the caddisfly Hesperophylax, and the cranefly

Ormosia were moderately abundant (Table 10-6). Alkalinity was rather high (428 mg/l), but other parameters were not unusual (Table 10-7).

Site MF-2 was located in 1980 opposite the active mine area and about 30 m upstream of a small settling pond. This stretch consisted of pools connected by riffles. Gravel was the primary substrate component of the riffles, while the substrate of the pools was mainly sand with a silt

10.3.2.6 Aquatic Organisms (continued)

overburden. Riffles and pools were about 1.2 m wide and had mean depths of 4.5 cm and 13.5 cm, respectively. Water velocity of the riffles was about 7-8 cm/sec.

Oligochaetes were the most numerous (21.3 percent) of the seventeen aquatic intertebrate taxa collected at MF-2. Young stonefly instars, the stonefly Pteronarcella badia, the mayflies Ameletus and Cinygmula, the caddisfly Hesperophylax, and the midge Chironomidae each had at least fifteen representatives (Table 10-6). The water was warmer at MF-2 than MF-1 in 1980. Dissolved oxygen was significantly lower than at MF-1 and the pH was slightly higher (Table 10-7).

In 1981 this site was located at approximately the same point as it was in 1980. In 1981, the flow pattern was primarily riffle-run and no true pools were noted. The substrate was mainly hard-packed clay with rubble evenly distributed over the clay, a fine layer of silt covered the substrate. In this stretch the stream occupied a narrow channel (about 0.4 m) and flowed through a deeply cut ravine (about 2 m to 3 m). Cottonwood and aspen provided a moderately complete canopy and cottonwood leaf packs were lodged among the rubble.

The two aquatic invertebrate samples yielded only 24 specimens of eleven taxa. Cinygmula sp. was the most

10.3.2.6 Aquatic Organisms (continued)

common organism (25.0 percent). All other taxa were represented by three or fewer individuals (Table 10-6).

Dissolved oxygen was higher (8.0 mg/l) than at MF-1 and alkalinity was lower (359.5 mg/l). Other physicochemical parameters were not unusual (Table 10-7).

Site MF-3 was located about 1.8 km above the confluence of Mill Fork and Huntington Creek in November 1980. Pool habitat was slightly more prevalent than riffle. Pools averaged about 1.2 m wide and 16.8 cm deep; riffles varied from about 0.5 m to 1.5 m wide and were about 4.8 cm deep. Riffle substrate was mainly gravel with some rubble. The pools had a sand-gravel substrate overlaid with silt and abundant leaf litter. Water velocity in the riffles was about 15 cm/sec. The riparian vegetation provided a rather dense canopy. The site the creek was covered with ice from about 100 m below MF-3 to its juncture with Huntington Creek.

The mayfly Baetis was the most abundant of the eighteen taxa collected in two Surber samples at MF-3 in 1980. Six other taxa (Malenka sp., Isoperla sp., Ameltus sp., Heptagenia sp., Hesperophylax sp., and Atherix variegata) were moderately common (Table 10-6). Water temperature, dissovled oxygen, and conductivity at MF-3 were more similar to readings obtained at MF-1 than MF-2 in 1980, while the pH of MF-3 was more similar to MF-2 than MF-1 (Table 10-7).

10.3.2.6 Aquatic Organisms (continued)

Because of changes in discharge, MF-3 was moved about 0.6 km farther downstream in April 1981. Water flowed only a short distance (less than 0.3 km) in the vicinity of MF-3 and disappeared about 15 m below the site. The substrate in this stretch was primarily sand and small gravel and silt covered all substrate components. Riffle-run was the main flow pattern, but several small (about 0.5 m by 0.5 m) plunge basins had been formed by debris dams. Water velocity did not exceed 15 cm/sec in the riffles. Organic debris in the area was less than at the more upstream sites during the spring survey, and riparian vegetation provided an incomplete canopy.

Eleven aquatic invertebrate taxa were collected in four samples at MF-3 in 1981. The stonefly Neumouridae and the stonefly Nemouridae and the midge Chiromidae were the most common organisms (32.9 and 41.1 percent, respectively). All other forms were present in low numbers (Table 10-6).

LB-1, the sample station for Little Bear Creek in 1981, was located about 300 m upstream from the confluence with Huntington Creek. Note: Water is removed from the headwater spring and diverted into a 12 in. pipe by the town of Huntington. Construction of the pipeline did not appear to have caused introduction of disturbed soil into the creek

10.3.2.6 Aquatic Organisms (continued)

when the stream was visited. However, the diversion of water from the spring results in lower flows than would occur naturally. Nonetheless, surface flows in Little Bear Creek were greater than in Mill Fork in April 1981. The stream alternated between a single channel and a braided network. The substrate was primarily bedrock with some gravel. For much of its course the stream was heavily shaded by conifers and deciduous shrubs.

Twelve aquatic invertebrate taxa were obtained in two Surber samples. Baetis sp. was the most common organism (45.0 percent), while Oligochaetes and chironomids were moderatley abundant (16.5 and 15.6 percent, respectively) (Table 10-6). The rather low pH at LB-1 reflected the moderately high hardness (393.8 mg/l) of the water. The high hardness was also evidenced by a calcareous coating on twigs and exposed roots submersed below the waterline. Dissolved oxygen and water temperature readings were not unusual (Table 10-7).

Overall, the aquatic macroinvertebrate community of Mill Fork in the study area was more diverse in fall 1980 than in spring 1981. The principal reason for this probably is that surface flows were greatly reduced in April, and Mill Fork therefore provided less total available habitat. The somewhat greater permanence of running water in the upper portions of Mill Fork are reflected in higher numbers in aquatic organisms (Table 10-6).

10.3.2.6 Aquatic Organisms (continued)

Aside from the low numbers related to persistence of flow, the benthic macroinvertebrate community of both Mill Fork and Little Bear Creek were typical of small mountain streams in the region. The major taxa are adapted to low flows, and the few permanent pools provide a source for active or inactive repopulation of sections subject to seasonal desiccation.

10.3.3 Species of Special Significance

In addition to the prevalent terrestrial vertebrates described above, including those listed by DWR as being of high priority to Utah, are a number of species which are of special significance for legal reasons. These include species listed by FWS as "threatened" or "endangered" at the national level or as "Migratory Birds of High Federal Interest."

10.3.3.1 Threatened and Endangered Species

Listed "t and e" species potentially present in the study are the American Peregrine Falcon Falco peregrinus anatum, which breeds in Utah; Arctic Peregrine Falcon Falco peregrinus tundrius, which migrates through Utah; and Bald Eagle Haliaeetus leucocephalus, which winters in Utah.

10.3.3.1 Threatened and Endangered Species

None of the species is likely to occur, because habitats in the area are marginal. However, areas of potential occurrence include riparian forests along Huntington Canyon for the Bald Eagle, cliff areas in the region for the American Peregrine Falcon, and upland areas for the Arctic Peregrine Falcon.

10.3.3.2 Migratory Birds of High Federal Interest

This group of especially significant species is comprised of 22 bird species identified by FWS as occurring in the Uintah-Southwestern Utah Coal Production Region (see Section 10.2.2.2 above for a summary of criteria used in compiling this list):

1. Bald Eagle
2. Golden Eagle
3. Ferruginous Hawk
4. Cooper's Hawk
5. Peregrine Falcon
6. Prairie Falcon
7. Merlin
8. Osprey
9. Spotted Owl
10. Burrowing Owl
11. Flammulated Owl
12. Sandhill Crane
13. Great Blue Heron
14. Long-billed Curlew
15. Band-tailed Pigeon
16. Pileated Woodpecker
17. Williamson's Sapsucker
18. Lewis' Woodpecker
19. Black Swift
20. Western Bluebird
21. Scott's Oriole
22. Grace's Warbler

10.3.2.2 Migratory Birds of High Federal Interest (continued)

Based on information provided by DWR (1978, 1981a) and site-specific field surveys, five of these species are actually or potentially specific field surveys, five of these species are actually or potentially present in the study area, besides the Bald Eagle, Golden Eagle, Peregrine Falcon, and Band-tailed Pigeon previously discussed in this report.

The most likely raptors are the Cooper's Hawk Accipiter cooperii and Flammulated Owl Otus flammeolus, both of which occur in the Wasatch Plateau and prefer wooded country, such as in Mill Fork and Little Bear Creek Canyons. DWR (1981a) has reported the study area as providing substantial habitat for Prairie Falcons Falco mexicanus as well. However, the distance from potential nest sites on cliff faces in the area to expansive grassland hunting habitats -- and the existing levels of human activity --probably preclude this species from utilizing the site and vicinity.

Williamson's Sapsucker Sphyrapicus thyroideus was determined to breed near the study area during the site-specific field studies. The presence of this species is not surprising, because the open aspen/conifer mosaic provides preferred nesting habitat (Crockett and Hadow 1975, Crockett and Hansley 1978), and it has been reported as breeding in "all the mountainous counties of the state" (Hayward et al. 1976:120). Although no nests were located, the status of Williamson's Sapsucker as a breeder was

10.3.3.2 Migratory Birds of High Federal Interest (continued)

inferred from observations of courting adults in spring and juveniles (in the same area) in late summer. The area in which the sapsuckers were observed was an open aspen stand between Mill Fork and a PJ slope about 2 km west of the permit boundary in Section 17.

The Black Swift Cypseloides niger also breeds in the Wasatch Plateau (DWR 1978), generally on cliff sites near or behind a waterfall. The near absence of mesic cliff sites in the study area greatly reduces the likelihood that the Black Swift is present as a breeder. However, it would not be surprising for Black Swifts to use the area for hunting, because they are wide-ranging in their search for insect prey. White-throated Swifts Aeronautes saxatalis were common along cliffs in the study area, but this species is of no special status in Utah.

The Western Bluebird Sialia mexicana is the other listed species which would not be particularly surprising in the study area, based on known occurrence elsewhere in the Wasatch Plateau and habitat preference (i.e., open conifers, from pinyon/juniper to spruce/fir). This species most likely would occur as isolated pairs in the breeding season or as small flocks at lower elevations in the winter; none was observed during field studies. As noted previously, the closely related Mountain Bluebird is an uncommon resident in the study area, utilizing aspen cavities for breeding and open pinyon/juniper for winter foraging.

10.4 Potential Impacts on Fish and Wildlife

Wildlife impacts typically can be categorized into three groups: loss or modification of habitat, disturbance, and mortality.

The limited amount of surface distrubance associated with the Huntington Canyon No. 4 Mine will result in a total habitat loss of about 78 acres during the life of the mine. With the mine in existence, this loss of habitat has already occurred. Virtually all of the mine activity is confined to the Pinyon/Juniper/Mountain Mahogany habitat type, and it does not appear that this loss of habitat has had a significant impact on wildlife in the permit area.

Disturbance of furtive species results from the levels of noise and activity associated with an operational mine. Thus, most larger species of birds and mammals (including, for example, deer, carnivores, and raptors) tend to avoid the mine site, at least during working hours. Most of these species are likely to move freely around the mine site on weekends and to quickly re-inhabit the area after decommissioning.

Two types of mortality potentially are associated with operation of the Huntington Canyon No. 4 Mine: raptor electrocutions on unsafe power poles and mammal roadkills. A raptor hazard survey was conducted for Beaver Creek Coal Company in conjunction with baseline field studies. The results of this survey indicate that the raptor hazard is slight, because (1) most poles utilize a relatively safe armless configuration, (2) the positioning of the poles relative to adjacent topography would tend to limit use, (3) most of the raptors commonly present in the area are not frequent users of powerline perches, and (4) the least safe pole designs are near the active mine, where raptor use probably is minimal. Figure 10-9 shows the most common pole configuration on the distribution line along Mill Fork Canyon.

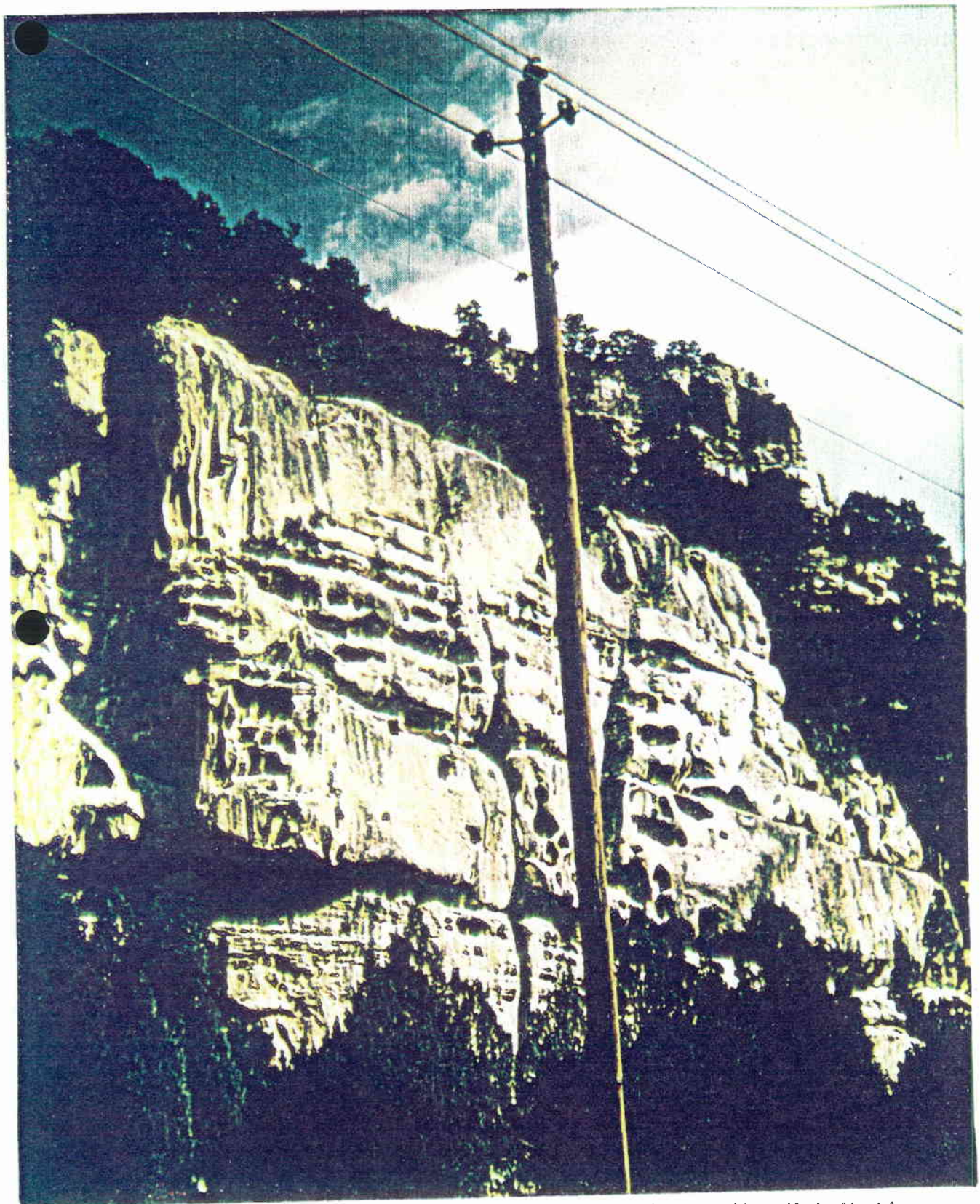

Figure 10-9. The most common powerpole configuration on the distribution line along Mill Fork Canyon. The cliff face in the background is an effective barrier to deer movement between Mill Fork and south-facing slopes along most of its length.

10.4 Potential Impacts on Fish and Wildlife (continued)

Mule Deer roadkills along the Mill Fork access and haulage road have been monitored by Beaver Creek Coal Company; to date, no roadkills have been reported. This is not surprising, because a steep cliff face along most of its length serves as an effective barrier to deer movement (Figure 10-9). Road crossing surveys were conducted during the winter of 1980-81 to investigate the potential problem of deer-vehicle collisions along the Mill Fork access and haulage road by identifying preferred deer crossing sites. The major deer crossing, accounting for 13 of the 23 sets of tracks observed, was near the confluence of Mill Fork and Huntington Canyon in the extreme northwestern part of Section 22 (Figure 10-8). A number of other deer crossing sites, generally associated with minor side drainages such as the boundary of Sections 16 and 21, were used less frequently. These crossings accounted for only about 40 percent of the actual tracks recorded.

Overall, the roadkill risk is higher in the early morning and late afternoon/early evening, when deer are most active. The greatest hazard is in late winter, when deer are likely to move regularly between south-facing slopes and the riparian zones -- and thus across the Mill Fork Canyon access/haul road. Crossing peaks also are expected to coincide with seasonal migrations between summer range and winter range, which tend to be concentrated along topographic funnels such as major drainages. However, this represents a fairly brief period, whereas winter range along Mill Fork is occupied for periods of up to a few months.

Beaver Creek Coal Company also has monitored roadkills along the Huntington Canyon Road, with a total of three deer collisions reported between the access road turnoff and the Huntington Canyon Powerplant

10.4 Potential Impacts on Fish and Wildlife (continued)

between May 1980 and May 1981; two involved Beaver Creek Coal Company employees or coal haulage contractors. All of the collisions occurred in late winter/early spring, coinciding with the season of highest deer concentration at the lower elevations of the study area.

Field investigations indicate that the most severe impact to terrestrial wildlife in the study area has been intensive and apparently prolonged overgrazing by domestic herbivores. The decrease in the total production and quality of forage limits the carrying capacity of both large and small mammals, and hence for predators that depend on them for food.

Impacts to aquatic ecosystems also have been minor. Moreover, water quality, habitat quality, and macroinvertebrate studies revealed no indications that Mill Fork has sustained any diminution in overall value as a result of the operation of the Huntington Canyon No. 4 Mine. The only apparent effect has been the addition of fine particles wafting or washing into the creek from the adjacent access road. Even this, however, has had far less influence on the Mill Fork ecosystem than the inherently low and variable flows.

Little Bear Creek has been unaffected by mining, but water diversion near its headwaters by the town of Huntington has resulted in lower than natural flows. This small stream is expected to remain unimpacted if underground mining is extended into Little Bear Canyon, unless the channel is disturbed by subsidence.

10.4 Potential Impacts on Fish and Wildlife (continued)

Because Mill Fork and Little Bear Creek have been essentially unaffected by the mining operation, and should remain so, Huntington Creek is also essentially unaffected. The greatest potential risk is the inflow of sediments following a high intensity precipitation event or unusually high spring runoff. Mitigation measures already incorporated into the operational design of the Huntington Canyon No. 4 Mine have substantially reduced the likelihood of this potential impact (see the following section).

10.5 Mitigation and Management Plans

As noted in the preceding sections of this report, the Huntington Canyon No. 4 Mine is an existing operation, for which no major additional surface disturbances presently are planned. Therefore, the mitigation and management plans focus on minimizing impacts related to continued mining activities and facilitating rapid return of the site to suitable habitat after decommissioning.

Many of the mitigation and impact avoidance procedures utilized in the following sections have been drawn from information provided to Beaver Creek Coal Company by DWR (1981b). A number of these measures also were proffered by Beaver Creek Coal Company in their interim submittal to DOGM, which was prepared prior to receipt of DWR's document.

DWR (1981b) emphasized three basic aspects to mitigation and impact avoidance for the terrestrial habitats at the Huntington Canyon No. 4 Mine: habitat and wildlife protection, reclamation, and wildlife management.

10.5.1 Terrestrial Habitats and Wildlife

Habitat protection measures center on avoiding especially important or sensitive areas, such as riparian zones, and not using persistent pesticides, which would diminish the long-term health of an ecosystem.

Reclamation is particularly important as a means of controlling erosion and restoring disturbed areas to productive wildlife habitat.Recommended procedures in achieving the reclamation goal include (1) planting a diverse mixture of native grasses, forbs, and (where appropriate) woody species, (2) using seedling stock rather than relying solely on seeds for trees or shrubs, (3) actually transplanting stock or turf from new disturbed sites to reclaimed sites, and (4) leaving islands of natural vegetation in new disturbed sites.

Wildlife management is important for minimizing harmful effects (e.g., fencing animals out of areas containing toxic substances) and preventing damage to newly reclaimed areas (e.g., excluding large herbivores and possibly controlling rodents). Specific types of mitigation, impact avoidance, and wildlife management procedures recommended by DWR (1981b) and Beaver Creek Coal Company consultants include the following.

10.5.1.1 Mammals

For small mammals, most of which are secretive and have small home ranges, mitigation will be almost totally related

10.5.1.1 Mammals (continued)

to habitat protection and reclamation -- i.e., ways of minimizing short- and long-term habitat loss. For larger species, such as big game carnivores and ungulates, the problem is complicated by their large home ranges, seasonal movements, and sensitivity to disturbance.

Disturbance-related impacts will be mitigated to a significant extent by Beaver Creek Coal Company policies against harassing or hunting wildlife in the permit area. These policies will continue throughout the operation of the mine. Further, "employee awareness" programs will specifically inform mine personnel of especially sensitive periods or habitats, such as deer fawning seasons and areas, bear dens, critical winter areas, and so forth. Roadkills will be minimized by an employee awareness program, and reminders at critical seasons (e.g., late winter). In addition, these sensitive aspects of the ecosystem will be avoided during future exploration, operation, and reclamation activities.

10.5.1.2 Birds

Like small mammals, songbirds and other small species are most sensitive to habitat loss, and mitigation will therefore focus on habitat protection and reclamation. In addition, active nests or nest trees will not be disturbed.

10.5.1.2 Birds (continued)

For raptors and gamebirds, which like large mammals are more wide-ranging and susceptible to disturbance, an employee awareness program will ensure that active nests or other "crucial-critical" use areas are avoided during the sensitive season and that the birds are not harassed or killed. The potential raptor electrocution hazard posed by some powerline pole configurations has been determined by U.S. Fish and Wildlife Service raptor biologist Ron Joseph to not require corrective modification (see Section 10.4 above).

10.5.1.3 Reptiles and Amphibians

Besides minimizing habitat loss and restoring native vegetation, the principal mitigation measures for heptiles will be to avoid killing individuals and to not disturb or destroy snake dens, amphibian breeding ponds, and other sensitive use areas.

10.5.2 Aquatic Habitats and Organisms

Habitat loss or deterioration of the Mill Fork aquatic ecosystem has been limited by establishing a 100 ft buffer strip adjacent to the stream and constructing sediment ponds to protect the stream from an increased sediment load from the mine affected area. Additional details of these procedures for protecting Mill Fork are provided in Sections 3.2.8, 3.2.9, and 7.2.3 of the mine permit application.

10.6 Stream Buffer Zone Determination

Beaver Creek Coal Company has committed to maintaining a 100 ft buffer zone along Mill Fork. This approach is expected to ensure that the stream channel and adjacent riparian vegetation will remain free of physical disturbance by the continued mining operation.

10.7 Fish and Wildlife Monitoring

Beaver Creek Coal Company will conduct a wildlife monitoring program throughout the operational life of the Huntington Canyon No. 4 Mine. The monitoring program will utilize the sevices of a full-time environmental specialist and, as necessary, professional consultants to evaluate the ongoing success of operational mitigation measures, ensure that threatened or endangered species and sensitive or critical use areas remain undisturbed by future activities, deal with any unforeseen difficulties which might arise, and participate in reclamation efforts upon completion of the project.

Three aspects of the monitoring program have already been initiated by Beaver Creek Coal Company: (1) monthly inspections of specific stations along Mill Fork to monitor sediment load, (2) routine reporting by coal haulage personnel of any roadkills along the access corridor, and (3) spring surveys of the site to locate -- and thus avoid -- active raptor nests.

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TABLE 10-8

Mammals in the Huntington Canyon No. 4 Mine Study Area
Emery County, Utah (1980-1981)

Species	Status	Relative Abundance*	Habitat Preference*
SORICIDAE			
Northern Water Shrew *Sorex palustris*	potential	uncommon	riparian
Merriam's Shrew *S. merriami*	potential	uncommon	ubiquitous
Vagrant Shrew *S. vagrans*	likely	common	riparian, meadows
Masked Shrew *S. cinereus*	likely	common	moist sites
Dusky Shrew *S. obscurus*	likely	common	conifers, meadows
VESPERTILIONIDAE			
Little Brown Myotis *Myotis lucifugus*	likely	common	caves, riparian
Small-footed Myotis *M. leibii*	likely	uncommon	caves, cliffs
Long-legged Myotis *M. volans*	likely	common	cliffs, trees
Long-eared Myotis *M. evotis*	likely	common	conifers
Fringed Myotis *M. thysanodes*	likely	uncommon	caves, cliffs
Yuma Myotis *M. yumanensis*	likely	uncommon	caves
California Myotis *M. californicus*	likely	common	caves, cliffs
Silver-haired Bat *Lasionycteris noctivagans*	likely	common	conifers
Western Pipistrelle *Pipistreilus hesperus*	likely	common	caves, cliffs
Big Brown Bat *Eptesicus fuscus*	likely	common	caves, cliffs
Red Bat *Lasiurus borealis*	likely	uncommon	conifers, riparian
Hoary Bat *L. cinereus*	likely	uncommon	conifers, riparian
Western Big-eared Bat *Plecotus townsendii*	likely	common	caves, cliffs

*Includes onsite observation and DWR regional information.

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
LEPORIDAE			
White-tailed Hare *Lepus townsendii*	potential	common	sagebrush, grassland
Snowshoe Hare *L. americanus*	likely	common	conifers, aspen
Black-tailed Hare *L. californicus*	potential	common	sagebrush, grassland
Mountain Cottontail *Sylvilagus nuttallii*	observed	common	conifers, pinyon/juniper
Desert Cottontail *S. audubonii*	potential	common	sagebrush, pinyon/juniper
SCIURIDAE			
Red Squirrel *Tamaisciurus hudsonicus*	observed	common	conifers
Rock Squirrel *Spermophilus variegatus*	observed	common	ubiquitous
Uintah Ground Squirrel *S. armatus*	observed	common	dry meadows
Golden-mantled Ground Squirrel *S. lateralis*	observed	common	ubiquitous
Northern Flying Squirrel *Glaucomys sabrinus*	potential	common	conifers
Yellow-bellied Marmot *Marmota flaviventris*	likely	common	rocky areas
Least Chipmunk *Eutamius minimus*	observed	common	ubiquitous
Uintah Chipmunk *E. umbrinus*	observed	common	ubiquitous
Cliff Chipmunk *E. dorsalis*	likely	common	pinyon/juniper
GEOMYIDAE			
Northern Pocket Gopher *Thomomys talpoides*	present	common	meadows

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
GEOMYIDAE (continued)			
Valley Pocket Gopher *T. bottae*	potential	common	meadows
HETEROMYIDAE			
Great Basin Pocket Mouse *Perognatuus parvus*	potential	common	pinyon/juniper
Ord's Kangaroo Rat *Dipodomys ordii*	potential	common	pinyon/juniper
CASTORIDAE			
Beaver *Castor canadensis*	potential	common	aquatic
CRICETIDAE			
Western Harvest Mouse *Reithrodontomys megalotis*	potential	common	sagebrush, grassland
Deer Mouse *Peromyscus maniculatus*	likely	abundant	ubiquitous
Canyon Mouse *P. crinitus*	likely	common	rocky areas
Brush Mouse *P. boylii*	likely	common	brushlands
Pinyon Mouse *P. truei*	likely	common	pinyon/juniper
Bushy-tailed Woodrat *Neotoma cinerea*	likely	common	ubiquitous
Muskrat *Ondatra zibethicus*	likely	common	aquatic
Meadow Vole *Microtus pennsylvanicus*	likely	common	meadows
Mountain Vole *M. montanus*	likely	common	meadows
Richardson's Vole	likely	common	meadows

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
CRICETIDAE (continued)			
M. richardsoni Long-tailed Vole	likely	common	meadows, brushland
M. longicaudus			
MURIDAE			
Norway Rat *Rattus norvegicus*	potential	common	mine areas
House Mouse *Mus musculus*	potential	common	mine areas
ZAPODIDAE			
Western Jumping Mouse *Zapus princeps*	likely	common	riparian, meadows
ERETHIZONTIDAE			
Porcupine *Erethizon dorsatum*	observed	common	wooded areas
CANIDAE			
Coyote *Canis latrans*	present	common	ubiquitous
Red Fox *Vulpes vulpes*	likely	common	ubiquitous
Gray Fox *Urocyon cinereoargenteus*	likely	common	riparian, conifers
URSIDAE			
Black Bear *Ursus americanus*	present	common	ubiquitous
PROCYONIDAE			
Ring-tailed Cat *Bassariscus astutus*	likely	common	riparian, brushland
Raccoon *Procyon lotor*	potential	irregular	riparian

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
MUSTELIDAE			
Short-tailed Weasel *Mustela erminea*	potential	uncommon	ubiquitous
Long-tailed Weasel *M. frenata*	likely	common	ubiquitous
Mink *M. vison*	potential	uncommon	meadows, riparian
Marten *Martes caurina*	likely	uncommon	conifers
Wolverine *Gulo luscus*	potential	rare	conifers, aspen
Badger *Taxidea taxus*	potential	common	sagebrush, grasslands
Spotted Skunk *Spilogale putorius*	likely	common	riparian, brushlands
Striped Skunk *Mephitis mephitis*	likely	common	ubiquitous
FELIDAE			
Bobcat *Lynx rufus*	present	common	ubiquitous
FELIDAE (continued)			
Canada Lynx *L. canadensis*	potential	rare	conifers, aspen
Cougar *Felis concolor*	likely	uncommon	ubiquitous
CERVIDAE			
Mule Deer *Odocoileus hemionus*	observed	common	ubiquitous
Moose *Alces alces*	potential	uncommon	meadows, aquatic
American Elk *Cervus elaphus*	observed	common	ubiquitous

TABLE 10-9

Birds in the Huntington Canyon No. 4 Mine Study Area
Emery County, Utah (1980-1981)

Species	Status	Relative Abundance	Habitat Preference
PODICIPEDIDAE			
Pied-billed Grebe *Podilymbus podiceps*	potential, summer	uncommon	wet areas
ANATIDAE			
Mallard *Anas platyrhynchos*	potential, summer	uncommon	wet areas
Green-winged Teal *A. crecca*	potential, summer	uncommon	wet areas
Blue-winged Teal *A. discors*	potential, summer	uncommon	wet areas
CATHARTIDAE			
Turkey Vulture *Cathartes aura*	observed, summer	uncommon	ubiquitous
ACCIPITRIDAE			
Goshawk *Accipiter gentilis*	observed, resident	uncommon	conifers, aspen
Sharp-shinned Hawk *A. striatus*	observed, resident	common	wooded areas
Cooper's Hawk *A. cooperii*	potential, resident	uncommon	wooded areas

*Includes onsite observation and DWR regional information.

Table 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
ACCIPITRIDAE (Continued)			
Red-tailed Hawk *Buteo jamaicensis*	observed, resident	common	ubiquitous
Swainson's Hawk *B. swainsoni*	likely, summer	uncommon	ubiquitous
Rough-legged Hawk *B. lagopus*	likely, winter	uncommon	ubiquitous
Golden Eagle *Aquila chrysaetos*	observed, resident	uncommon	ubiquitous
Bald Eagle *Haliaeetus leucocephalus*	potential, winter	irregular	ubiquitous
Marsh Hawk *Circus cyaneus*	likely, resident	uncommon	open areas
FALCONIDAE			
Prairie Falcon *Falco mexicanus*	potential, resident	uncommon	open areas
Peregrine Falcon *F. peregrinus*	potential, migrant	irregular	open areas
Merlin *F. columbarius*	potential, winter	uncommon	open areas
American Kestrel *F. sparverius*	observed resident	uncommon	open areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TETRAONIDAE			
Blue Grouse *Dendragapus obscurus*	likely, resident	common	conifers, aspen
Ruffed Grouse *Bonasa umbellus*	potential, resident	common	aspen, brushlands
Sage Grouse *Centrocercus urophasianus*	potential, resident	uncommon	sagebrush
PHASIANIDAE			
California Quail *Lophortyx californicus*	potential, resident	common	brushlands
Chukar Partridge *Alectoris chukar*	potential, resident	common	rocky areas
Ring-necked Pheasant *Phasianus colchicus*	potential, resident	common	agricultural
ARDEIDAE			
Great Blue Heron *Ardea herodias*	potential, summer	uncommon	wet areas
Snowy Egret *Egretta thula*	potential, summer	irregular	wet areas
Black-crowned Night Heron *Nycticorax nycticorax*	potential, summer	irregular	wet areas
GRUIDAE			
Sandhill Crane *Grus canadensis*	potential, migrant	irregular	meadows

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
RALLIDAE			
Sora Rail *Porzana carolina*	potential, resident	uncommon	meadows
American Coot *Fulica americana*	potential, summer	uncommon	wet areas
SCOLOPACIDAE			
Common Snipe *Capella gallinago*	potential, resident	uncommon	meadows
Spotted Sandpiper *Actitis maculata*	potential, resident	uncommon	wet areas
PHALAROPODIDAE			
Wilson's Phalarope *Steganopus tricolor*	potential, migrant	uncommon	wet areas
Northern Phalarope *Lobipes lobatus*	potential, migrant	uncommon	wet areas
COLUMBIDAE			
Band-tailed Pigeon *Columba fasciata*	potential, summer	irregular	brushland
Mourning Dove *Zenaida macroura*	observed, migrant	irregular	ubiquitous
CUCULIDAE			
Yellow-billed Cuckoo *Coccyzus americanus*	potential, summer	irregular	riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
STRIGIDAE			
Screech Owl *Otus asio*	present, resident	uncommon	riparian
Flammulated Owl *Otus flammeolus*	potential, resident	irregular	conifers
Great Horned Owl *Bubo virginianus*	observed, resident	common	ubiquitous
Pygmy Owl *Glaucidium gnoma*	potential, resident	irregular	wooded areas
Long-eared Owl *Asio otus*	likely resident	common	wooded areas
Short-eared Owl *A. flammeus*	potential, resident	uncommon	open areas
Saw-whet Owl *Aegolius acadicus*	potential, resident	irregular	conifers
CAPRIMULGIDAE			
Poor-will *Phalaenoptilus nuttalli*	potential, resident	uncommon	wooded areas
Common Nighthawk *Chordeiles minor*	observed, summer	uncommon	ubiquitous
APODIDAE			
Black Swift *Cypseloides niger*	potential, summer	uncommon	rocky areas
White-throated Swift *Aeronautes saxatalis*	observed, summer	common	rocky areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TROCHILIDAE			
Black-chinned Hummingbird *Archilochus alexandri*	observed, summer	uncommon	brushlands
Broad-tailed Hummingbird *Selasphorus platycercus*	observed, summer	common	ubiquitous
Rufous Hummingbird *Selasphorus rufus*	likely summer	common	ubiquitous
Calliope Hummingbird *Stellula calliope*	likely, summer	common	conifers, aspen
ALCEDINIDAE			
Belted Kingfisher *Megaceryle alcyon*	potential resident	uncommon	aquatic
PICIDAE			
Common Flicker *Colaptes auratus*	observed, resident	common	wooded areas
Yellow-bellied Sapsucker *Sphyrapicus varius*	observed, resident	common	riparian, aspen
Wiliamson's Sapsucker *S. thyroideus*	observed, summer	uncommon	aspen, conifers
Hairy Woodpecker *Picoides villosus*	observed, resident	common	conifers, aspen
Downy Woodpecker *P. pubescens*	obseved, resident	common	riparian, aspen
Northern Three-toed Woodpecker *P. tridactylus*	likely, resident	uncommon	conifers

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TYRANNIDAE			
Eastern Kingbird *Tyrannus tyrannus*	potential, summer	common	agricultural
Western Kingbird *T. verticalis*	likely, summer	common	pinyon/juniper
Cassin's Kingbird *T. vociferans*	potential, summer	uncommon	pinyon/juniper
Ash-throated Flycatcher *Myiarchus cinerascens*	observed, summer	uncommon	pinyon/juniper, riparian
Willow Flycatcher *Empidonax traillii*	observed, summer	uncommon	riparian
Hammond's Flycatcher *E. hammondii*	observed, summer	common	conifers
Dusky Flycatcher *E. obserholseri*	observed, summer	common	aspen, brushlands
Gray Flycatcher *E. wrightii*	potential, summer	irregular	dry wooded areas
Western Flycatcher *E. difficilis*	observed, summer	common	moist wooded areas
Olive-sided Flycatcher *Nuttallornis borealis*	observed, summer	uncommon	conifers
Western Wood Pewee *Contopus sordidulus*	observed, summer	common	aspen
Say's Phoebe *Sayornis saya*	likely, resident	uncommon	open areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
ALAUDIDAE			
Horned Lark *Eremophila alpestris*	potential, resident	uncommon	open areas
HIRUNDINIDAE			
Violet-green Swallow *Tachycineta thalassina*	observed, summer	common	wooded areas
Tree Swallow *Iridoprocne bicolor*	observed, summer	common	wooded areas
Rough-winged Swallow *Stelgidopteryx ruficollis*	potential, summer	common	wet areas
Barn Swallow *Hirundo rustica*	potential, summer	common	ubiquitous
Cliff Swallow *Petrochelidon pyrrhonota*	observed, summer	common	rocky areas
Purple Martin *Progne subis*	potential, summer	uncommon	open forests
CORVIDAE			
Steller's Jay *Cyanocitta stelleri*	observed, resident	common	conifers, aspen
Gray Jay *Perisorius canadensis*	potential, resident	irregular	conifers
Scrub Jay *Aphelocoma coerulescens*	potential, resident	common	pinyon/juniper

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
CORVIDAE (continued)			
Black-billed Magpie *Pica pica*	observed, resident	uncommon	ubiquitous
Common Raven *Corvus corax*	observed, resident	common	ubiquitous
Common Crow *C. brachyrhynchos*	likely	irregular	ubiquitous
Pinyon Jay *Gymnorhinus cyanocephalus*	observed, resident	common	pinyon/juniper
Clark's Nutcracker *Nucifraga columbiana*	observed, resident	common	conifers
PARIDAE			
Black-capped Chickadee *Parus atricapillus*	observed, resident	common	wooded areas
Mountain Chickadee *P. gambeli*	observed, resident	common	conifers, aspen
Plain Titmouse *P. inornatus*	observed, resident	uncommon	pinyon/juniper
Bushtit *Psaltriparus minimus*	likely, resident	common	pinyon/juniper
SITTIDAE			
White-breasted Nuthatch *Sitta carolinensis*	observed, resident	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
SITTIDAE (continued)			
Red-breasted Nuthatch *S. canadensis*	observed, resident	uncommon	conifers
Pygmy Nuthatch *S. pygmaea*	observed, resident	uncommon	conifers
CERTHIIDAE			
Brown Creeper *Certhia familiaris*	observed, resident	common	wooded areas
CINCLIDAE			
Dipper *Cinclus mexicanus*	potential, resident	uncommon	riparian
TROGLODYTIDAE			
House Wren *Troglodytes aedon*	observed, summer	common	aspen, conifers
Rock Wren *Salpinctes obsoletus*	observed, resident	abundant	rocky areas
Canyon Wren *Catherpes mexicanus*	observed, resident	uncommon	rocky areas
Bewick's Wren *Thryomanes bewickii*	potential, resident	common	pinyon/juniper
Marsh Wren *Cistothorus palustris*	potential, migrant	irregular	wet meadows

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
MIMIDAE			
Mockingbird *Mimus polyglottos*	potential, migrant	irregular	brushlands
Gray Catbird *Dumetella carolinensis*	observed, summer	uncommon	riparian
Sage Thrasher *Oreoscoptes montanus*	potential, resident	common	sagebrush
TURDIDAE			
American Robin *Turdus migratorius*	observed, resident	common	ubiquitous
Hermit Thrush *Catharus gattatus*	observed, summer	common	conifers
Swainson's Thrush *C. ustulatus*	observed, summer	uncommon	riparian, aspen
Veery *C. fuscenscens*	likely, summer	uncommon	riparian
Mountain Bluebird *Sialia currucoides*	observed, resident	uncommon	open woodlands
Western Bluebird *S. mexicana*	potential, resident	uncommon	open woodlands
Townsend's Solitaire *Myadestes townsendi*	observed, resident	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
SYLVIIDAE			
Blue-gray Gnatcatcher *Polioptila caerulea*	observed, summer	uncommon	pinyon/juniper
Golden-crowned Kinglet *Regulus satrapa*	likely, resident	uncommon	conifers
Ruby-crowned Kinglet *R. calendula*	observed, resident	common	wooded areas
BOMBYCILLIDAE			
Bohemian Waxwing *Bombycilla garrulus*	likely, winter	uncommon	ubiquitous
Cedar Waxwing *B. cedrorum*	likely, winter	uncommon	ubiquitous
LANIIDAE			
Northern Shrike *Lanius excubitor*	likely, winter	uncommon	open areas
Loggerhead Shrike *L. ludovicianus*	likely, resident	common	open areas
STURNIDAE			
Starling *Sturnus vulgaris*	potential, resident	common	agricultural
VIREONIDAE			
Solitary Vireo *Vireo solitarius*	observed, summer	uncommon	open conifers
Warbling Vireo *V. gilvus*	observed, summer	common	aspen, riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
PARULIDAE			
Orange-crowned Warbler *Vermivora celata*	observed, summer	uncommon	wooded areas
Nashville Warbler *V. ruficapilla*	likely, migrant	uncommon	riparian, brushlands
Virginia's Warbler *V. virginiae*	likely, summer	common	riparian, brushlands
Yellow Warbler *Dendroica petechia*	observed, summer	common	riparian
Yellow-rumped Warbler *D. coronata*	observed, summer	common	conifers, riparian
Black-throated Gray Warbler *D. nigrescens*	observed, summer	uncommon	pinyon/juniper
Townsend's Warbler *D. townsendi*	likely, migrant	uncommon	conifers
MacGillivray's Warbler *Oporornis tolmiei*	observed, summer	uncommon	riparian, brushlands
Common Yellowthroat *Geothylpis trichas*	likely, summer	uncommon	wet areas
Yellow-breasted Chat *Icteria virens*	likely, summer	common	riparian, brushlands
Wilson's Warbler *Wilsonia pusilla*	observed, summer	common	riparian
American Redstart *Setaphaga ruticilla*	likely, migrant	uncommon	riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
PLOCEIDAE			
House Sparrow *Passer domesticus*	potential, resident	common	agricultural
ICTERIDAE			
Western Meadowlark *Sturnella neglecta*	potential, resident	uncommon	open areas
Yellow-headed Blackbird *Xanthocephalus xanthocephalus*	potential, migrant	uncommon	wet areas
Red-winged Blackbird *Agelaius phoeniceus*	potential, resident	uncommon	wet areas
Brewer's Blackbird *Euphagus cyanocephalus*	potential, resident	uncommon	agricultural
Common Grackle *Quiscalus quiscula*	potential, migrant	irregular	agricultural
Brown-headed Cowbird *Molothrus ater*	likely, resident	uncommon	wooded areas
Northern Oriole *Icterus galbula*	likely, summer	common	riparian
THRAUPIDAE			
Western Tanager *Piranga ludoviciana*	observed, summer	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE			
Black-headed Grosbeak *Pheucticus melanocephalus*	observed, summer	common	riparian, brushlands
Evening Grosbeak *Hesperiphona vespertina*	likely, resident	uncommon	wooded areas
Lazuli Bunting *Passerina amoena*	likely summer	uncommon	riparian
Indigo Bunting *P. cyanea*	potential summer	irregular	riparian
House Finch *Carpodacus mexicanus*	likely, resident	uncommon	ubiquitous
Cassin's Finch *C. cassinii*	observed, resident	uncommon	conifers
Pine Grosbeak *Pinicola enucleator*	likely, resident	uncommon	conifers
Rosy Finch *Leucosticte arctoa*	likely, winter	irregular	ubiquitous
American Goldfinch *Carduelis tristis*	likely, resident	common	riparian, agricultural
Lesser Goldfinch *C. psaltria*	likely, resident	common	riparian, brushlands
Pine Siskin *C. pinus*	observed resident	common	conifers, riparian
Red Crossbill *Loxia curvirostra*	observed, resident	common	conifers

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE (continued)			
Rufous-sided Towhee *Pipilo erythrophthalmus*	observed, resident	uncommon	riparian
Green-tailed Towhee *P. chlorura*	observed, summer	common	brushlands
Dark-eyed Junco *Junco hyemalis*	observed, resident	common	ubiquitous
Gray-headed Junco *J. caniceps*	observed, summer	common	conifers, aspen
Savannah Sparrow *Passerculus sandwichensis*	potential, summer	uncommon	wet meadows
Vesper Sparrow *Pooecetes gramineus*	potential, summer	uncommon	open areas
Lark Sparrow *Chondestes grammacus*	potential summer	uncommon	brushlands
Black-throated Sparrow *Amphispiza bilineata*	potential, summer	uncommon	brushlands
Sage Sparrow *A. belli*	potential summer	uncommon	sagebrush
Tree Sparrow *Spizella aborea*	likely, winter	uncommon	brushlands
Chipping Sparrow *S. passerina*	observed, summer	common	conifers
Brewer's Sparrow *S. breweri*	potential summer	irregular	sagebrush

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE (continued)			
Harris' Sparrow *Zonotrichia querula*	potential, winter	irregular	brushland, riparian
White-crowned Sparrow *Z. leucophrys*	observed, resident	common	conifers, riparian
Fox Sparrow *Z. iliaca*	potential, resident	irregular	riparian
Lincoln's Sparrow *Melospiza lincolnii*	likely, resident	uncommon	wet meadows
Song Sparrow *M. melodia*	observed, resident	common	riparian

TABLE 10-10

Reptiles and Amphibians in the Huntington Canyon
No. 4 Mine Study Area, Emery County, Utah (1980-81)

Species	Status*	Relative Abundance*	Habitat Preference
AMBYSTOMATIDAE			
Tiger Salamander *Ambystoma tigrinum*	likely	common	aquatic
PELOBATIDAE			
Great Basin Spadefoot Toad *Saphiopus intermontanus*	likely	common	ubiquitous
BUFONIDAE			
Western Toad *Bufo boreas*	potential	uncommon	ubiquitous
Woodhouse Toad *B. woodhousei*	likely	common	ubiquitous
HYLIDAE			
Western Chorus Frog *Pseudacris triseriata*	likely	common	aquatic, wet meadows
RANIDAE			
Leopard Frog *Rana pipiens*	likely	common	aquatic
IGUANIDAE			
Collared Lizard *Crotaphytus collaris*	likely	common	rocky areas
Leopard Lizard *C. wislizenii*	potential	common	rocky areas
Eastern Fence Lizard *Sceloporus undulatus*	likely	common	rocky areas
Sagebrush Lizard *S. graciosus*	potential	common	brushland
Tree Lizard *Urosaurus ornatus*	likely	common	brushland

*Includes onsite observation and DWR regional information.

TABLE 10-10 (Continued)

Species	Status	Relative Abundance	Habitat Preference
IGUANIDAE (Continued)			
Side-blotched Lizard *Uta stansburiana*	potential	common	open areas
Short-horned Lizard *Phryonosoma douglassi*	potential	common	open areas
TEIDAE			
Western Whiptail *Chemidophorus tigris*	likely	common	open areas
BOIDAE			
Rubber Boa *Charina bottae*	likely	common	ubiquitous
COLUBRIDAE			
Striped Whipsnake *Masticophis taeniatus*	likely	common	ubiquitous
Racer *Coluber constrictor*	likely	common	open areas
Ring-necked Snake *Diadophis punctatus*	potential	irregular	moist areas
Bullsnake *Pituophis melanoleucus*	likely	common	ubiquitous
Milk Snake *Lampropeltis triangulatum*	potential	irregular	ubiquitous
Sonora Mountain Kingsnake *L. pyromelana*	potential	irregular	wooded areas
Wandering Garter Snake *Thamnophis elegans*	likely	common	ubiquitous
Common Garter Snake *T. sirtalis*	potential	irregular	moist areas
Night Snake *Hypsiglena torquata*	potential	common	brushlands
CROTALIDAE			
Western Rattlesnake *Crotalus viridis*	likely	common	rocky or open areas

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Section 10
FISH AND WILDLIFE RESOURCES

10.1 Scope

This report summarizes fish and wildlife studies conducted for Beaver Creek Coal Company (by Wetern Resource Development Corporation) at the Huntington Canyon No. 4 Mine, Emery County, Utah. The purposes of the investigations were to comply with requirements for fish and wildlife studies of mining affected areas for the Utah Division of Oil, Gas, and Mining (DOGM) and to provide Beaver Creek Coal Company with data useful in planning future mining activities and long-term reclamation programs.

In meeting these basic objectives, the fish and wildlife studies were designed to supply the following types of information: (1) species composition and diversity of the various habitat types; (2) seasonal patterns of distribution and relative abundance; (3) habitats or areas of special value to wildlife, such as big game winter range or movement corridors and raptor nest sites; and (4) the actual or potential status of species listed as threatened, endangered, rare, or of particular interest by the Utah Division of Wildlife Resources (DWR) or the U.S. Fish and Wildlife Service (FWS).

Data were obtained during field trips to the study area in early September, early October, and middle November 1980, and late February, late April, late May, late June/early July, and middle August 1981.

10.1.2 Location and Ecological Setting

The Huntington Canyon No. 4 Mine study area is located along the

10.1.2 Location and Ecological Setting (continued)

eastern edge of the Wasatch Plateau in Emery County, Utah. (See Figure 1-2 near the front of the permit application.) Topographically, the study area consists of steep slopes on the face of the plateau and along major drainages, flat surfaces on terraces or floodplains in the valley bottoms, and relatively gentle terrain on top of the plateau (Figure 10-1). The area is underlain by nearly flat-lying sedimentary rocks of the Tertio-Cretaceous North Horn formation and the Lower Tertiary Flagstaff Formation, with Cretaceous Mancos Shale in the lowest portions of the property along the Mill Fork and Little Beaver Creek drainages.

The study area has a highly continental climate, with large daily and seasonal variations in temperature. The lower elevations of the permit area are quite dry, with average annual precipitation of 14 inches or less, mostly falling as spring and late summer rain showers. Higher elevations receive more precipitation, much of it as snow which persists through the winter.

The vegetation of the study area is highly variable, due to differences in elevation and exposure. Major habitats include Mountain Shrub, Mixed Riparian, Aspen, Pinyon/Juniper, Middle Elevation Conifer, and High Elevation Conifer associations. Most of the major habitats are represented by phases with different plant dominants; detailed descriptions of major and minor habitats are presented in Section 10.3.1, below.

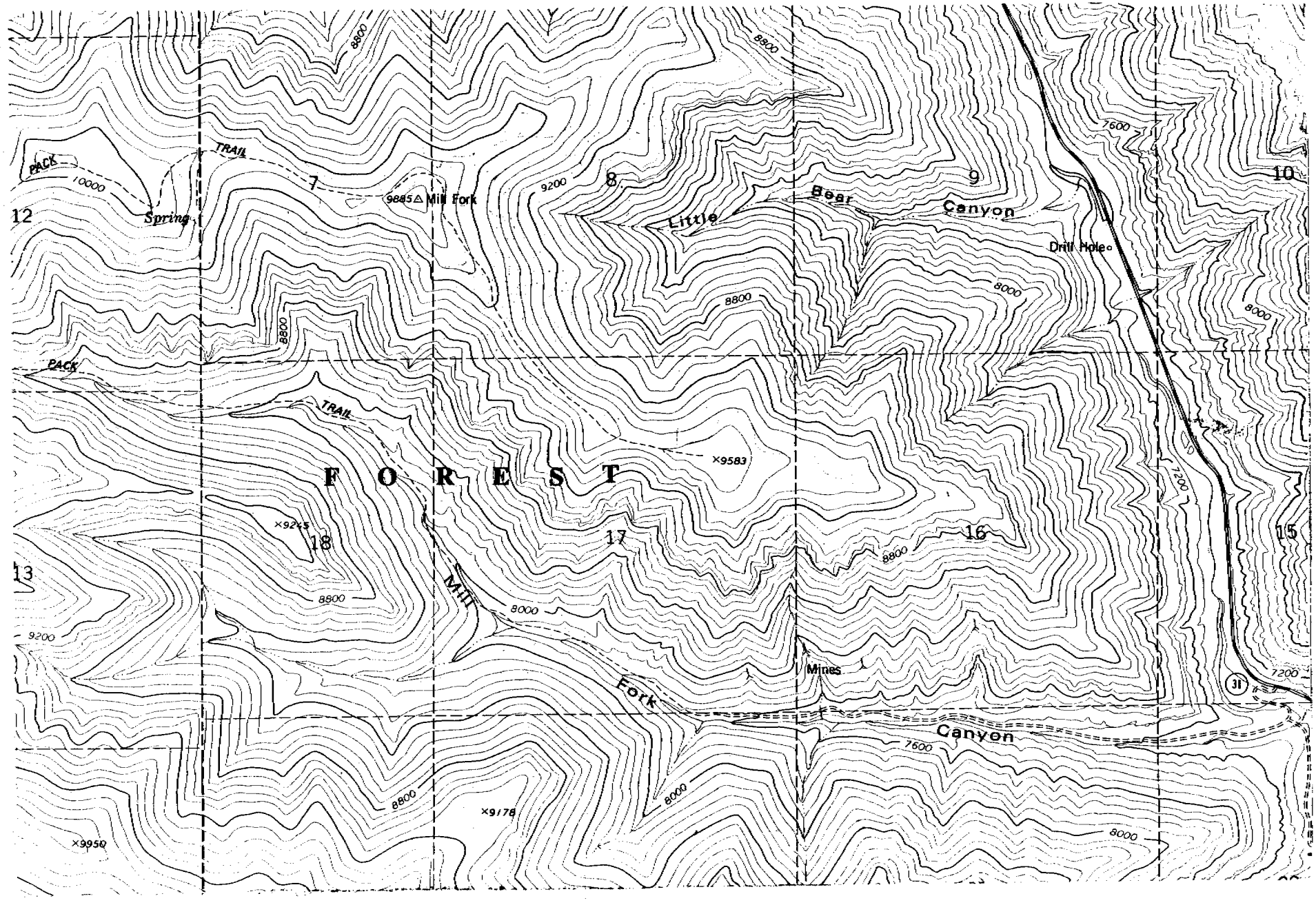

Figure 10-1. The general study area for the Huntington Canyon No. 4 Mining Project, Emery County, Utah. (Source: USGS 7.5' topographic quadrangle map, Rilda Canyon, Utah).

10.2 Methodology

10.2.1 Literature Review

One of the initial steps in the fish and wildlife studies was to review open-file data and range maps available from the DWR Regional Office in Price, Utah. The purpose of this effort was two-fold: first, it provided a regional backdrop of wildlife information; second, it was helpful in identifying areas of concern to DWR and thus ensuring that their needs and preferences were addressed.

The other major purpose of the literature review was to obtain pertinent publications on the distribution and status of vertebrates in the study region (i.e., the Wasatch Plateau). These books, articles, and monographs provided information on species likely to occur in the area and served as a basis for evaluating the representativeness of the Huntington Canyon No. 4 Mine site.

In March 1981, DWR provided detailed wildlife information for the Huntington Canyon No. 4 site, as requested by Beaver Creek Coal Company, pursuant to UMC 783.20. DWR also prepared a wildlife plan representing their recommendations for mitigation and impact avoidance procedures, pursuant to UMC 784.21. The information compiled by DWR in preparing their response to Beaver Creek Coal Company's request comprises a substantial portion of this report, as does DWR's 1978 publication on vertebrate species of southeastern Utah. Specific elements from these DWR documents are cited throughout this report as DWR (1981a), DWR (1981b), and DWR (1978).

10.2.2 Terrestrial Studies

The methods used during field work were designed to provide descriptive and quantitative data for terrestrial wildlife in the mine plan area. Wildlife data collection for the Huntington Canyon No. 4 Mine studies followed a stratified approach based on habitat types. In many instances, wildlife habitats did not strictly coincide with plant communities, being based on topographic as well as vegetational factors. Therefore, some plant community units were combined or split to best reflect wildlife utilization. The correlations between the two are summarized in the description of each habitat type (Section 10.3.1 below).

The methods employed in addressing the various groups of terrestrial vertebrates were discussed informally with Larry Dalton of DWR in Price, Utah, in September 1980, prior to initiating field studies. These methods are summarized in the following sections.

10.2.2.1 Mammals

For the purpose of field study, this diverse group of organisms was divided into large mammals, medium-sized mammals, and small mammals.

Large mammals consist of large herbivores and large carnivores. For the Huntington Canyon No. 4 Mine studies, these species were studied through a combination of systematic transects and opportunistic sightings. Driven surveys along the Huntington Canyon No. 4 Mine access road

10.2.2.1 Mammals (continued)

were used during each field session to obtain data on abundance, distribution, and habitat use; these data were augmented with walked transects across each habitat type. Walked transects afforded an opportunity to evaluate differential habitat uses from indices such as pellet-group densities and percent browse utilization. Opportunistic sightings during other wildlife efforts were particularly useful for species either too uncommon or furtive to be regularly encountered during systematic surveys or restricted to limited habitats. Aerial surveys were initially proposed but were dropped at the request of DWR.

Medium-sized mammals, such as predators, lagomorphs (rabbits and hares), and large rodents were also surveyed by a combination of systematic and opportunistic techniques. Road transects at dawn and dusk were important for predators and lagomorphs, most of which are most active at these times (i.e., "crepuscular"). Data on sign of the crepuscular species and on actual observation of diurnal species were recorded in conjunction with various daytime field efforts.

Small mammals, which may be used as indicators of ecosystem quality and reclamation success, were to have been surveyed using Sherman live-traps set in lines through each habitat type. As with aerial surveys, DWR specified

10.2.2.1 Mammals (continued)

that this technique not be used. Therefore, small mammal information presented in this report is drawn almost exclusively from DWR (1978) and Durrant (1952).

10.2.2.2 Birds

The most efficient grouping of birds for field studies and baseline reports is raptors, upland fowl, waterbirds, and small birds or songbirds.

Raptors were observed and recorded opportunistically throughout the field program. Daytime surveys were best for hawks and eagles, while dawn/dusk surveys resulted in most sightings of owls. In addition, areas of potential importance -- e.g., cliffs, riparian areas, and abandoned buildings -- were specifically searched in an attempt to locate nest sites. Raptor surveys followed the standard survey techniques described by Call (1978).

Upland gamebird surveys were conducted in conjunction with other field programs and relied primarily on chance encounters of the birds or their sign. Special effort was placed on determining if upland fowl breed in the study area or are present in sufficient numbers to offer recreational value.

10.2.2.2 Birds (continued)

Waterbirds (waterfowl, shorebirds, wading birds) were in a similar approach as other large birds -- i.e., opportunistically during all field programs plus specific visits to suitable habitats, such as ponds and slow-moving streams. As with upland gamebirds, emphasis was placed on determining the extent to which the study area provided breeding sites and the importance of these species as a recreational resource.

"Small birds" are a heterogeneous group. For the Huntington Canyon No. 4 Mine wildlife studies, this group included perching birds, woodpeckers, humingbirds, swifts, and frogmouths. In late summer, fall, and winter surveys, the presence, distribution, and abundance of small birds was determined along walked transects in each habitat type and by opportunistic sightings during the initial site reconnaissance. During the breeding season (spring and early summer), quantitative data were obtained by counting the number of breeding pairs (territorial males) of each species within numerous plots located systematically along transect routes through each habitat type. Audial identification was emphasized during this census to avoid problems of differential detectability of species (as a function of conspicuousness and activity patterns) and visual penetrability of habitats (e.g., a dense willow thicket versus an open stand of mountain brush).

10.2.2.3 Reptiles and Amphibians (continued)

breeding period, when they could be identified by their vocalizations.

10.2.3 Aquatic Studies

Field and lab methods used in the Huntington Canyon No. 4 Mine aquatic studies were selected to assist Beaver Creek Coal Company environmental staff in describing the biotic and abiotic components of study area streams, discerning possible impacts of the existing mining operation, and recommending future mitigation and monitoring programs. Biotic components specifically included sampling for macroinvertebrates and evaluating the fisheries potential. Abiotic components included field techniques for testing water quality, as well as descriptions of substrate and channel morphology. Studies were conducted in November 1980 and April 1981.

10.2.3.1 Sample Site Selection

Three sample sites were selected in November 1980 to provide data on Mill Fork above, opposite, and below the mining affected area. In the autumn survey, site selection was limited primarily by ice cover. During the spring survey, waterflow was more intermittent, and the original upper and lower sites were dry, thus necessitating their relocation.

The sample site on Little Bear Creek was located in a representative stretch about 300 m above its confluence with Huntington Creek.

10.2.3.2 Habitat Quality

Basic physicochemical characteristics of surface water related to aquatic ecosystem quality were evaluated using standard field equipment during both the fall and spring surveys. In November 1980, temperature and conductivity were measured with a Yellow Springs Model 33 S-C-T meter, hydrogen ion concentration was calculated with an Ace mini-pH meter, and dissolved oxygen was measured by the modified Winkler method. In April 1981, chemical characteristics were determined with a Hach Fish Culturist water chemistry kit, while temperature was measured with a mercury thermometer submersed for at least 5 minutes.

10.2.3.3 Aquatic Invertebrates

Biological community surveys involved use of a 0.5 mm mesh Surber sampler to collect aquatic invertebrates. At each sample site, the substrate was agitated with a 1 ft^2 area to dislodge invertebrates, which were swept by the stream current into a trailing net. Surber samples were collected from at least one pool and one riffle at each site. The combined pool/riffle samples were fixed in the field and returned to the lab for enumeration and identification to the lowest practicable taxonomic level (usually genus). Identification was based on standard reference works for the region (e.g., Baumann et al. 1977, Merritt and Cummins 1978, Pennak 1978).

10.2.3.3 Aquatic Invertebrates (continued)

Nongame fish were to be sampled with a dipnet to determine species composition and relative abundance, but none was observed during either survey.

10.3 Existing Fish and Wildlife Resources

10.3.1 Wildlife Habitats in the Mine Plan Area

Wildlife habitat types were identified and described during the initial field visits to the Huntington Canyon No. 4 Mine site. As described in Section 10.2.2 above, wildlife habitats do not strictly correspond to vegetation community types. In most studies, more wildlife habitats are recognized than are plant communities, because (1) wildlife values generally can be differentiated at the phase (subcommunity) level and (2) some habitats, such as rock outcrops, cliffs, and scree slopes, are not plant-related at all.

Habitats distinguishable at the Huntington Canyon No. 4 Mine Site are described below.

10.3.1.1 Pinyon/Juniper Woodlands

"PJ" haibtats, prevalent on south-facing slopes with rocky substrates of blocky sandstone, were extensive in the study area (see the Vegetation Map, Plate 9-1). Most

10.3.1.1 Pinyon/Juniper Woodlands

Pinyon/Juniper areas were dominated by open stands of Pinyon Pine Pinus edulis, Rocky Mountain Juniper Juniperus scopulorum, and Utah Juniper Juniperus osteosperma, with large Curl-leaf Mountain Mahogany Cercocarpus ledifolius (Figure 10-2). In a few places, the conifers were essentially lacking, resulting in a Mountain Mahogany "woodland." Many of the Mountain Mahogany more closely resembled small trees than shrubs being over 3 m high and having a single large trunk near the ground. Scattered Ponderosa Pine Pinus ponderosa and Douglas-fir Pseudotsuga menziesii were conspicuous in more mesic sites, especially valley bottoms, and Serviceberry Amelanchier sp. was occasionally present in significant numbers.

Prominent PJ understory species included Big Sagebrush Artemisia tridentata, Fringed Sage Artemisia frigida, Broom Snakeweed Xanthocephalum sarothrae, Salina Wildrye Elymus salinus, Indian Ricegrass Oryzopsis hymenoides, Scarlet Globemallow Sphaeralcea coccinea, Scarlet Gillia Ipomopsis aggregata, and Gumweed Tansy-aster Machaeranthera grindelioides.

10.3.1.2 Middle Elevation Conifer Forests

North-facing slopes, such as south of Mill Fork across from the mine site (Figure 10-3), were cloaked in a dense coniferous forest consisting of both low- and high-elevation components. White Fir Abies concolor, Douglas-fir, and

Figure 10-2. Pinyon/Juniper habitat on south-facing slopes along Mill Fork Canyon. Note mine road running diagonally from lower left corner, dense Middle Elevation Conifers in lower right, and Mixed Riparian zone along valley floor.

Figure 10-3. Middle Elevation Conifers on north-facing slope and Mixed Riparian zone in valley, Mill Fork Canyon. Conifers are Douglas-fir and White Fir, deciduous trees are Narrowleaf Cottonwood.

10.3.1.2 Middle Elevation Conifer Forests

Engelmann Spruce Picea engelmannii were codominants of this unit, although it is referred to only as "Douglas-fir" on the Vegetation Map (Plate 9-1). The understory included a variety of shrubs, such as Snowberry Symphoricarpos sp., Currant Ribes sp., Mountain-lover Pachystima myrsinites, Wood's Rose Rosa woodsii. and Oregon Holly-grape Mahonia repens.

Common Juniper Juniperus communis was particularly well developed as a shrub stratum in some sites, especially in exposed areas where the conifer understory was more open. Limber Pine Pinus flexilis and Bristlecone Pine Pinus aristata were also present, generally as scattered individuals along forest edges. These two species occasionally formed a wind-related ecotone between south-facing conifer stands and subalpine dry meadows near steep ridgetops (Figure 10-4).

10.3.1.3 Mixed Riparian Forests

Streamside communities in the permit area -- i.e., along Fork and Little Bear Creek --generally were characterized by typical riparian vegetation (Figure 10-3, Plate 9-1). Prominent tree species were Narrowleaf Cottonwood Populus angustifolia, Quaking Aspen Populus tremuloides, Douglas-fir, White Fir, Engelmann Spruce, and Blue Spruce Picea pungens. Large deciduous shrubs included Thinleaf Alder Alnus tenuifolia, Western River Birch Betula

Figure 10-3. Little Bear Canyon in the northeastern portion of the study area, viewed from Huntington Canyon. Note dense Middle Elevation Conifers to the left, open Pinyon/Juniper with scattered Douglas-firs to the right, and Mixed Riparian zone in the foreground. Bare area on ridgeline is a burned conifer stand.

10.3.1.3 Mixed Riparian Forests (continued)

occidentalis, Mountain Maple Acer glabrum, Redtwig Dogwood (Swida sericea) (Cornus stolonifera), Elderberry Sambucus cf. coerulea, Chokecherry Prunus virginiana var. melanocarpa, and a number of willow Salix species.

10.3.1.4 Aspen Forests

Quaking Aspen formed rather extensive stands on top of the plateau west of the permit boundary (i.e., Mill Fork Mountain), especially along drainages. Typical aspen understories included Arnica, Aster, Castilleja, Erigeron, Fragaria, Frasera, Geranium, Heliomeris, Lathyrus, Ligusticum, Lupinus, Osmorhiza, Smilacina, Thalictrum, and Vicia. In a few sites, however, grazing by sheep had apparently been so intense historically that weedy or nonpalatable plants dominated, e.g., Achillea, Cynoglossum, Delphinium, Dugaldia, Hackelia, Helianthus, Lappula, Phacelia, Taraxacum, Tragopogon, and Valeriana. Although shrubs were nearly absent in some places, Snowberry, Oregon Holly-Grape, Wood's Rose, and a variety of other woody species were typical of most aspen stands. Prominent grasses were Mountain Brome Ceratochloa marginata, Nodding Brome Bromopsis cf. porteri, Smooth Brome Bromopsis inermis, Slender Wheatgrass Agropyron

10.3.1.4 Aspen Forests (continued)

trachycaulum, Blue Wildrye Elymus glaucus, Orchardgrass Dactylis glomerata, and Western Needlegrass Stipa occidentalis. Aspen was not mapped as a separate unit on the Vegetation Map (Plate 9-1).

10.3.1.5 High Elevation Conifer Forests

The gentle terrain on top of the plateau supported dense stands of Engelmann Spruce, Subalpine Fir Abies lasiocarpa, and Douglas-fir, with a well developed understory of shrubs and forbs similar to the Middle Elevation Conifer type described above. Small drainages provided suitable sites for additional subalpine forbs, such as Aconitum, Cardamine, Mertensia, Mimulus, and Polemonium. As indicated on the Vegetation Map (Plate 9-1), upper slopes in the Little Bear Canyon area had burned in the past, resulting in open slopes with the charred remains of mature conifers still standing (Figure 10-4).

10.3.1.6 Subalpine Dry Meadows and Sagebrush

Plateau habitats in the permit area included open areas dominated by native and introduced rangeland grasses, weedy forbs (listed under the Aspen habitat description), and in some areas, dense sagebrush and snowberry shrublands. This unit is shown as Sagebrush Grassland on the Vegetation

10.3.1.6 Subalpine Dry Meadows and Sagebrush

Map (Plate 9-1). The distribution of the dry meadows and sagebrush appeared to be controlled in part by exposure, such as on knolls and steep south-facing slopes (Figure 10-5). Most such areas showed evidence of extreme overgrazing by sheep. In a few exposed sites, Common Junipers formed dense, low clumps reminiscent of krummholz at higher elevation tree limits.

10.3.1.7 Aquatic Ecosystems

The two major aquatic habitats within the study area are Mill Fork and Little Bear Creek.

Mill Fork originates on the eastern slope of East Mountain and flows eastward for about 5 mi before joining Huntington Creek. From its point of origin at about 10,120 ft to its terminus at about 7,040 ft, Mill Fork has a mean gradient of approximately600 ft/mi (11.4 percent). Like most small drainages in mountainous terain, it is concave in longitudinal profile, being much steeper near its head than its mouth. The stream is nearly straight, with a meander factor estimated at less than 5 percent.

Although indicated as a perennial stream on the USGS topographic quadrangle map for the area, Mill Fork actually is intermittent overall. In November 1980, the creek had flowing water in only about one-half of its length through

Figure 10-4.[5] *Exposure-related upper tree limit of mixed Limber Pine and Bristlecone Pine above the mine site (note absence of snow). Treeless areas are weedy dry meadows and dense sagebrush-snowberry shrub stands, heavily grazed by domestic sheep. Left background is High Elevation Conifer Forest.*

10.3.1.7 Aquatic Ecosystems (cont'd)

the study area (i.e., between its first tributary and its mouth) and was frozen throughout its lowest mile. Where flowing, discharge appeared not to exceed about 0.007 m^3/sec. In April 1981, discharge was even more restricted, with actual flow essentially limited to the stretch between the upper and lower sample sites, a length of about 300 m.

Little Bear Creek is fed primarily by a spring at about 9,000 ft, although snowmelt and precipitation runoff (enhanced by a burn in dense spruce/fir stands near the top of Little Bear Canyon) contribute to peak flows. Throughout its 1.5 mi length, Little Bear Creek is fairly steep, with an average gradient of about 1,200 ft/mi. The essentially permanent flow and greater discharge of Little Bear Creek (about 0.085 m^3/sec) compared to Mill Fork probably are related primarily to the presence of the spring, although slope, aspect, plant cover, and substrate may also contribute to the difference.

10.3.2 WILDLIFE

10.3.2.1 Aquatic Wildlife and Habitat Value Determination

Based on benthic macroinvertebrate and aquatic habitat surveys, and on data provided by DWR (1981a), Mill Fork supports neither game nor nongame (forage) fish and lacks

10.3.2.1 Aquatic Wildlife and Habitat Value Determination (cont'd)

sufficient flow in most years to provide spawning sites. However, the stream probably does contribute some invertebrate food items and a small amount of surface flow to Huntington Creek, an important fisheries in the region. The same is true of Little Bear Creek, which enters Huntington Canyon upstream of Mill Fork.

The greatest value of the Mill Fork and Little Bear Creek aquatic habitats is the water, cover, and food they provide to a variety of terrestrial vertebrates (see the following section).

No fish were seen or collected in either Mill Fork or Little Bear Creek during field studies, nor is a permanent fishery reported by DWR (1981a). The primary reason for the absence of fish from Mill Fork probably is the very low flows observed during both sampling sessions. Although the low flows may have been partly attributable to low precipitation in the region during the 1980-81 study period, examination of the creek channel indicates that the stream seldom carries substantially greater discharge. If fish do occasionally move into lower portions during periods of peak flow, their survival in the creek would be minimal, with movement back into Huntington Creek a more likely scenario.

10.3.2.1 Aquatic Wildlife and Habitat Value Determination (continued)

Little Bear Creek had more flow than Mill Fork (see Section 10.3.1.7), but regular use of the stream by fish probably is precluded by a combination of (1) very steep lower stretches, resulting in a partial barrier to migration from Huntington Creek, and (2) withdrawal of water at the source-spring throughout the summer by the town of Huntington, resulting in very low late summer flows.

Based on benthic macroinvertebrate and aquatic habitat surveys, and on data provided by DWR (1981a), both Mill Fork and Little Bear Creek contribute some invertebrate food items and a small amount of surface flow to Huntington Creek, an important fisheries in the region. Although the present study did not permit a quantitative estimate of the percentage of prey-base and water added to Huntington Creek by the two study area streams, the amounts appear to be small. Therefore, the greatest value of the Mill Fork and Little Bear Creek aquatic habitats is the water, cover, and food they provide to a variety of terrestrial vertebrates (see the following section).

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations

As used in this report, "value" incorporates both ecological and economic criteria. Examples of criteria used in

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations (continued)

in evaluating value include considerations such as whether a species is an indicator of environmental stress, critical to the food web as a prey or predator, important for monitoring programs (see Section 10.7 below), or represents a significant hunting or trapping resource. High value habitats are those which support especially high diversities or densities of wildlife, attract species not otherwise found in the area, or are important to high value wildlife species (as defined above).

Both site-specific field studies conducted for Beaver Creek Coal Company and information provided by DWR (1981a) indicate that the most important habitat type in the study area is the Mixed Riparian zone along Mill Fork, Little Bear Creek, and adjacent portions of Huntington Creek. The reasons for classifying Mixed Riparian as the highest priority wildlife habitat are the availability of water and the structural and compositional diversity of the plant community. The second point directly or indirectly affects a number of factors, such as feeding sites, nesting sites, resting or roosting sites, and quantity and quality of fooditems (such as herbage, seeds, fruit, invertebrates, and small vertebrates).

10.3.2.2 Terrestrial Wildlife and Habitat Value Determinations (continued)

Other high priority habitats listed by DWR (1981a) are seeps or springs which provide water, and cliffs which afford nesting sites for many species of raptorial birds.

Important and other prevalent wildlife species are discussed in the following sections, which are organized by taxonomic group.

10.3.2.3 Mammals

According to DWR (1978), 84 species of mammals are known to occur in the Wasatch Plateau region, of which 64 are expected to inhabit the study area. Twenty-five mammal species are considered by DWR (1981a) to be of high interest to the State of Utah. These species, and other species prominent in the study area, are described below.

Two bat species of special interest to Utah are the Red Bat Lasiurus borealis, which roosts in wooded areas, and the Western Big-eared Bat Plecotus townsendii, which roosts in caves, rock overhangs, tunnels, or abandoned buildings. See Appendix Table 10-8 for a complete listing of bat species potentially present in the study area.

10.3.2.3 Mammals (continued)

High interest (small game) lagomorphs observed in the study area are the Mountain Cottontail Sylvilagus nuttallii and Snowshoe Hare Lepus americanus. Based on DWR information (1981a), study area provides "substantial" habitat for the cottontail, while the mosaic of spruce/fir, aspen, and riparian zones at the highest elevations provides "high priority" breeding habitat to the hare. Lowest elevation pinyon/juniper habitats may support a few Desert Cottontail Sylvilagus audubonii, which DWR reports to occur below 7,000 ft in most areas (1981a).

One sciurid of high interest to Utah is the Northern Flying Squirrel Glaucomys sabrinus, for which both the Middle Elevation and High Elevation conifer stand-types potentially provide substantial habitat in the study area. Other prominent sciurids observed during field studies, but notclassified as being of special concern to Utah, are the Red Squirrel Tamiasciurus hudsonicus, which was common in mixed conifers; the Rock Squirrel Spermophilus variegatus (often mistaken for a tree squirrel) in Pinyon/Juniper; the

10.3.2.3 Mammals (continued)

Uintah Ground Squirrel S. armatus in dry meadows; the Golden-mantled Ground Squirrel S. lateralis and Uintah Chipmunk Eutamias umbrinus in Pinyon/Juniper and most higher elevation habitats; and the Least Chipmunk E. minimus in virtually every habitat. Sign (burrows) probably belonging to another species -- Northern Pocket Gopher Thomomys talpoides -- were observed in dry meadow and forest clearings above the Huntington Canyon No. 4 Mine study area.

One of the most important groups of terrestrial vertebrates are the small rodents, such as the cricetine and microtine mice, jumping mice, and pocket mice. These species are a vital link in the food web, particularly since they provide the vast bulk of prey for virtually all mammalian and avian predators. Small mammals were not addressed in this study, however, because DWR would not permit a live-trapping sampling program. However, Appendix Table 10-8 provides a list of species expected to occur inthe study area, based on known geographic ranges and ecological preferences.

The Beaver Castor canadensis is a resident of the Wasatch Plateau region, although none was observed in the study area during site-specific field investigations. The apparent absence of Beaver presumably is due to the paucity of

10.3.2.3 Mammals (continued)

flowing streams, with both Mill Fork and Little Bear Creek being too small and intermittent to offer suitable habitat. Muskrat Ondatra zibethicus also inhabit aquatic habitats in the vicinity of the study area, but, like the Beaver, none was observed during field studies, again owing to the scarcity of surface water.

Small carnivores of high interest (as furbearers) to Utah include a number of mustelids: Wolverine Gulo luscus, Badger Taxidea taxus, Marten Martes caurina, Mink Mustela vison, Long-tailed Weasel M. frenata, Short-tailed Weasel M. erminea, Striped Skunk Mephitis mephitis, and Spotted Skunk Spilogale putorius. This group also includes two procyonids, the Raccoon Procyon lotor and the Ringtail Bassariscus astutus.

Based on habitats within the study area, all of these species may occur, although the Raccoon and Mink show a fairly high affinity to surface water and thus are less likely than the other species. Appendix Table 10-8 summarizes the habitat preferences of the small carnivores reported by DWR (1978) as potentially present.

Larger carnivores reportedly present in the region (DWR 1978) are the Black Bear Ursus americanus, Mountain Lion Felis concolor, Bobcat Lynx rufus, Canada Lynx Lynx

10.3.2.3 Mammals (continued)

canadensis, Coyote Canis latrans, Red Fox Vulpus vulpus, and Gray Fox Urocyon cinereoargenteus. Black Bear are known to occur, based on reports by mine personnel and diagnostic sign, and appear to be especially common in wooded valley bottoms. Mountain Lions are likely to occur, with rugged areas along deeper valleys providing the most suitable habitat for denning.

Both the Coyote and Bobcat are known to occur, based on diagnostic sign and direct observation. These species inhabit a broad range of habitats and hence should be considered ubiquitous. Red Fox and Canada Lynx also occupy a variety of habitats, with the fox generally below and the lynx generally above middle elevations in the region. Neither of these species has been observed, nor has the Gray Fox, which tends to occur in low numbers within its range. Another species which theoretically is potentially present in the region is the Gray Wolf Canis lupus (DWR 1981a). However, this species is so rare -- if extant at all -- that it is of interest as an oddity rather than as a critical component of the ecosystem.

10.3.2.3 Mammals (continued)

Of the large predators discussed above, all but the Coyote and Gray Fox are classified as high interest species, based primarily on their value as game species (Black Bear and Mountain Lion), their regional decline (Canada Lynx), or their value in the commercial fur trade.

Large ungulates present on or near the mine permit site are Mule Deer Odocoileus hemionus, American Elk Cervus elaphus, and Moose Alces alces. Deer and elk are common in the region, and overall populations are reported by DWR (1981a) to be increasing for both species. Pre-hunting season aerial trend counts of mule deer in Herd Unit 34 (Table 10-1) indicate an approximate two-fold increase in the deer population from 1973 to 1980 (DWR 1980a). Aerial trend counts of elk in Herd Unit 12 (Table 10-2) indicate a similar increase in populations of that species from 1971 to 1980 (DWR 1980a). It should be emphasized that these numbers represent only trends in population size and are not estimates of population numbers.

Although Mule Deer age ratios (fawns/100 does) indicate a possible steady decline in herd productivity from 1975-1980, age ratios do not necessarily reflect true reproduction and

Table 10-1 Aerial trend counts and herd classification of Mule Deer in Herd Unit 34, (Huntington), Utah, 1973-1980

Year	1973	1974	1975	1976	1977	1978	1979	1980
Aerial Trend Count								
Pre-season	103	213	199	243	318	207	202	235
Post-season	000	000	208	203	273	262	200	227
Herd Classification (post-season)								
Fawns/100 does	000	000	122	108	105	66	78	71
Bucks/100 does	000	000	27	23	19	13	10	4

Table 10-2 Aerial trend counts and herd classification of American Elk in Herd Unit 12, (Mantis), Utah, 1971-1980

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Aerial Trend Count										
Pre-season	550	775	623	906	1269	1283	1278	1291	1106	1459
Herd classification (pre-season)										
Calves/100 cows	54	60	57	55	50	60	55	52	51	56
Bulls/100 cows	24	21	18	12	14	25	20	18	14	12

10.3.2.3 Mammals (continued)

are subject to misinterpretation without additional information, such as rates of increase or annual recruitment of females to the population (Caughley 1974). In general, however, there appears to have been a decrease in deer productivity (fawns/doe) during the past 6 years. The elk herd in Unit 12 shows an upward trend in population and relatively stable production, indicating the presence of a viable herd.

Habitats in the vicinity of the Huntington Canyon No. 4 Mine are mapped by DWR (1981a) as including high priority summer range and crucial-critical winter range for both deer and elk. Summer range for these species is the mosaic of conifers, aspen, and meadows atop the plateau. Although some summer range does occur at higher elevations within the permit area, it is more prevalent on East Mountain to the west and southwest, and Gentry Mountain to the east of Huntington Canyon.

Both the DWR (1980a) and Beaver Creek Coal Company Wildlife consultants have found summer range to be in generally fair to good condition, except for areas of overgrazing by domestic sheep. Within the study, dry meadows have received particularly heavy grazing pressure (see Section 10.3.1.6 above).

10.3.2.3 Mammals (continued)

Summer ranges generally are occupied by deer and elk from middle May through late October, although the exact timing may vary from year to year depending on temperature, snowfall, and range condition. While not a limiting factor to ungulate populations, summer range is important in providing energy reserves to meet deficiencies in winter energy supplies (Klein 1968, Baker and Hobbs 1981).

Winter range for deer and elk includes a variety of slope and vegetation types. Lower slopes throughout much of the study area are mapped by DWR (1981a) as crucial-critical elk winter range (Figure 10-6), based on vegetation types. Most elk winter range in the region occurs farther to the south, primarily in snow-free open areas, such as meadows and wind-swept ridgetops, interspersed with conifers and aspen for cover.

For deer, south- and east-facing slopes along portions of Mill Fork and Little Bear Creek canyons provide relatively warm and snow-free sites, which are especially important during severe winters (Figure 10-7). Xeric slopes within the study area generally support an open conifer woodland with an understory of shrubs and bunchgrasses. On predominantly

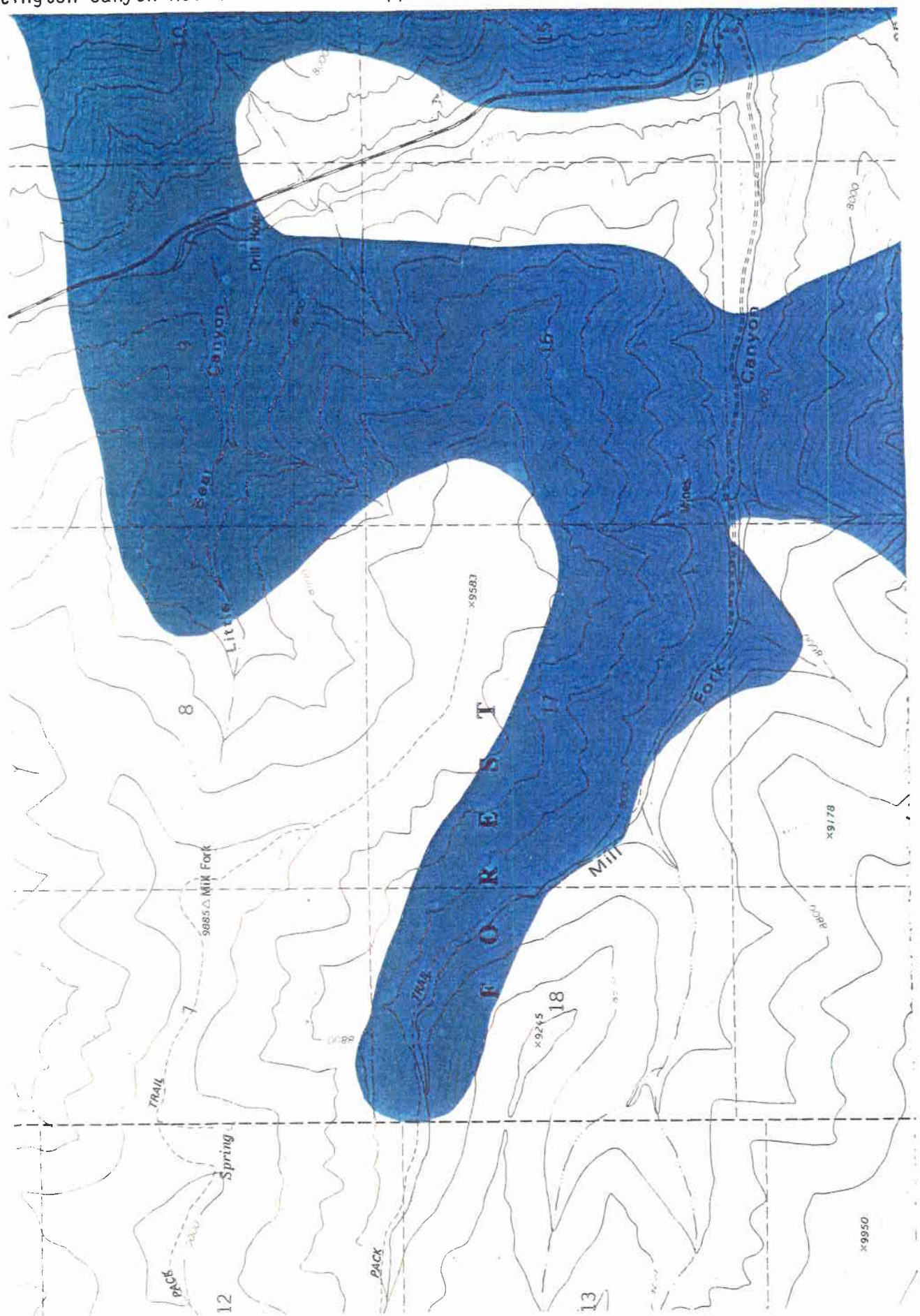

Figure 10-6. Crucial-critical winter range for American Elk in the study area (DWR 1981a).

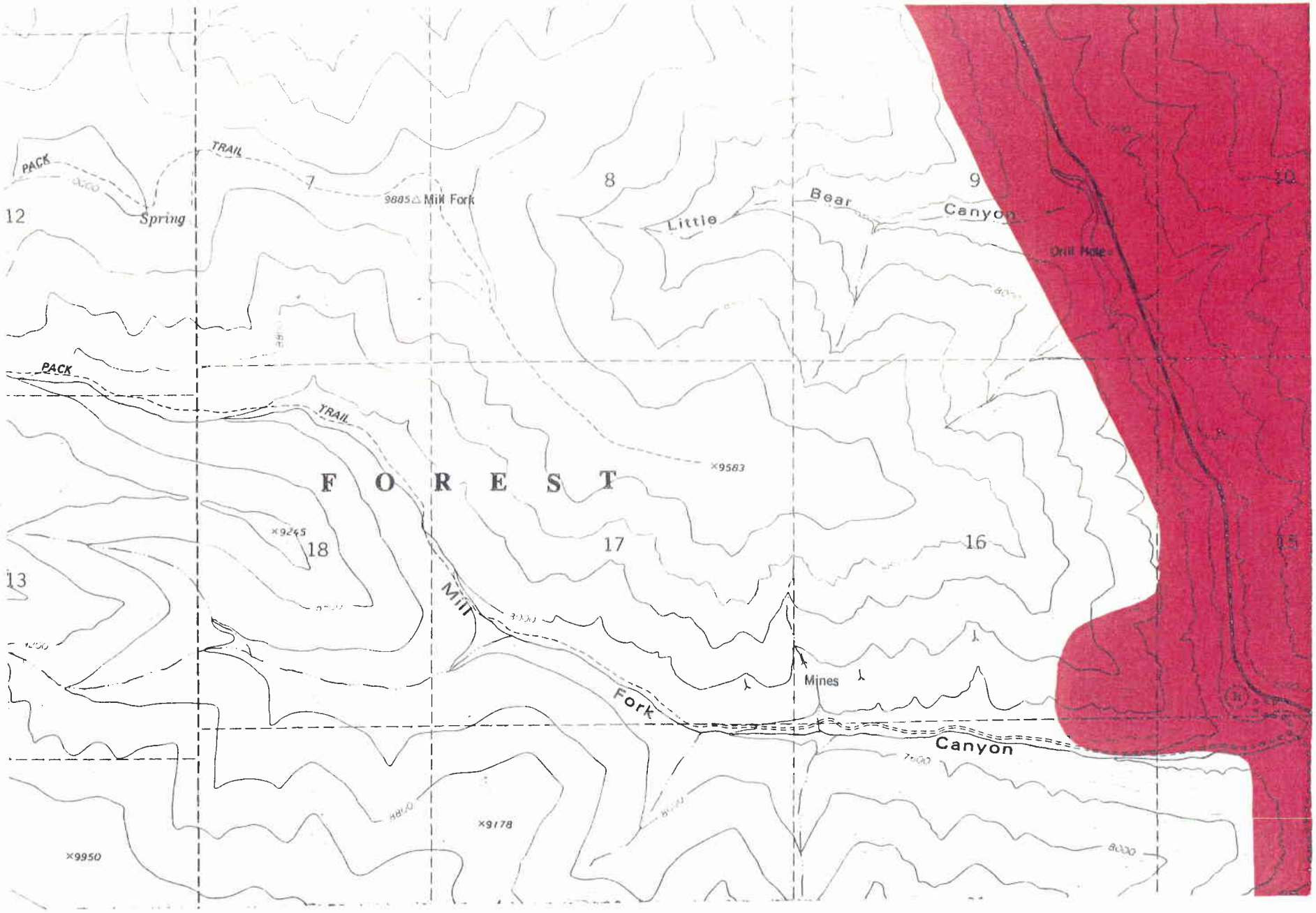

Figure 10-7. Crucial-critical winter range for Mule Deer in the study area (DWR 1981a).

10.3.2.3 Mammals (continued)

south-facing sites along Mill Fork Canyon, the conifers are dominated by Pinyon Pine, Rocky Mountain Juniper, and Utah Juniper, with scattered Ponderosa Pine and Douglas-fir (Figure 10-2). On east-facing sites along the west side of Huntington Canyon and lower Little Bear Canyon, the conifer stratum includes a more significant Douglas-fir component (Figure 10-5), probably due to aspect and a somewhat higher mean elevation.

Other important elements in winter range are riparian zones, which provide water, cover, and an abundance of browse, and north-facing slopes, which provide both hiding and thermal cover (Thomas 1979, Carpenter and Regelin 1981). Winter use by deer and elk of north-slope Middle Elevation conifers probably varies, depending on temperature and snow accumulation under the trees.

Deer pellet-group counts were conducted in the three major winter range habitat types to obtain an index of habitat preference (Robel et al. 1970). Habitat preference indices were calculated by dividing the percent frequency of sample plots containing deer pellet groups by the percentage of area coverd by each habitat within the permit area (Table 10-3). The Mixed Riparian habitat type appeared to be highly preferred over both the Middle Elevation Conifer and Pinyon/Juniper habitat types. The close juxtaposition of

Table 10-3 Big game winter range habitat preference indices for the Huntington Canyon No. 4 Mine, Emery County, Utah (1980-1981).

Habitat	Percent Habitat*	Percent of Plots With Sign	Habitat Preference Index
Pinyon/Juniper	80	50	0.67
Middle Elevation Conifer	15	70	4.7
Mixed Riparian	5	60	12.0

*Estimated winter range for permit area.

10.3.2.3 Mammals (continued)

the riparian and coniferous forest types makes these areas particularly attractive, due to the availability of both browse and thermal cover. The relatively high preference index for the Middle Elevation Conifer type probably is a proximity effect created by the adjacent riparian zone. Although field data suggested that Pinyon/Juniper was the least preferred, its importance as part of the total winter range should not be underestimated. As previously stated, south-facing slopes may be important when deer and elk are forced to seek open feeding areas during severe winters. (Note: The 1980-1981 winter during which field studies were conducted was unusually mild and snow-free, thus probably skewing survey results toward areas of thermal cover compared to more typical years.)

Elk calving and deer fawning occurs in the Wasatch Plateau region in late May and June. Although no specific sites have been identified in the study area by DWR (1980a, 1981a) or Beaver Creek Coal Company wildlife consultants, all riparian zones and other mesic habitat types are considered potential calving and fawning grounds. However, the large riparian belt along Huntington Creek probably is not utilized, owing to the proximity of State Highway 31. Similarly, the riparian area along Mill Fork opposite the Huntington Canyon No. 4 Mine probably receives little use

10.3.2.3 Mammals (continued)

during the critical parturition period because of mining activities and traffic on the access/coal haulage road. Upper reaches of Mill Fork Canyon, aspen-conifer-meadow mosaics on top of the plateau, and Little Bear Canyon are likely fawning and calving areas, based on habitat characteristics and the proximity of both winter and summer range.

Moose occur in the Wasatch Plateau, as a result of six transplants -- totalling 43 animals --during the winters of 1973, 1974, and 1978. Ten sightings were reported by DWR (1980a) between May 1973 and February 1978; the observations closest to the study area were in Crandall Canyon 4 km to the north and on Gentry Mountain 4 km to the east. DWR (1981a) reports that a portion of the study area provides Moose winter range, but field studies indicate that preferred habitat is quite limited. The Mill Fork and Little Bear Creek riparian zones are the most likely sites for Moose within the study area.

Because of DWR's unwillingness to permit aerial surveys, the topographic reliefs of the site, and poor access to most of the area by roads, it was not possible to estimate the populations of big game during the 1980-1981 field study. Even where populations estimates are possible, however, they are of limited value, for two major reasons. First, the

10.3.2.3 Mammals (continued)

animals have such large daily and seasonal ranges that periodic censuses do not accurately indicate the number of animals using a given area -- either on any one day or throughout the year. Second, the variable affecting population size and distribution are so numerous that estimating the herd size tells little about the influence of a single factor (such as the operation of a coal mine).

10.3.2.4 Birds

Approximately 140 species of birds are potentially present in the study area during at least part of the year (Table 10-9), of which 29 are listed by DWR (1981a) as being of high state interest. These species, which include game-birds and raptors, are discussed below, as are prominent small birds observed or expected in the study area.

Gamebirds include waterfowl, upland fowl (gallinaceous birds), and doves. Waterfowl do not provide a significant recreational resource in the study area because of the limited surface water. However, small wetgrass areas atop the plateau west of the property may receive occasional seasonal use by puddle ducks, such as Green-winged Teal Anas crecca and Mallard A. platyrhynchos.

Upland fowl potentially provide a more important recreation resource, with DWR (1981) reporting both the Blue Grouse

10.3.2.4 Birds (continued)

Dendragapus obscurus and Ruffed Grouse Bonasa umbellus as yearlong inhabitants of the study area. Blue Grouse concentrate in open stands of spruce and fir during the winter, where they feed on needles and buds. Thus, both middle and high elevation conifer forests provide potential "crucial-critical" winter range (DWR 1981a). Other habitat types occupied by this species include low elevation pinyon/juniper and mountain shrubland in the spring and high elevation conifer-aspen-meadow mosaic in summer and fall. Blue Grouse were not observed during field studies in the study area, but booming males were heard along slopes adjacent to Mill Fork west of the site in spring 1981.

Ruffed Grouse occupy a fairly broad range of habitats, especially aspen and mountain shrubland, although conifers often are used during the winter. DWR (1981a) reports that deciduous zones within 0.25 mi of a stream provide "high priority" habitat for Ruffed Grouse overall, while aspen forests afford "crucial-critical" habitat during the mid-winter period (the birds apparently rely on aspen staminate buds as a winter food source). Ruffed Grouse were not observed during site-specific field studies.

10.3.2.4 Birds (continued)

Other gamebirds in the region are the Band-tailed Pigeon Columba fasciata and Mourning Dove Zenaida macroura. The pigeon is uncommon in the Wasatch Plateau, usually occurring as isolated stragglers or small flocks at irregular intervals in spruce/fir habitats (DWR 1981a). The dove is a much more likely inhabitant of the region, with pinyon/juniper and riparian habitats potentially providing high priority nesting habitat. It should be noted, however, that site-specific field studies indicate a fairly low abundance of Mourning Doves in the study area, perhaps partially due to the scarcity of reliable surface water. From this standpoint, seeps and springs on the south-facing pinyon/juniper slope above the Huntington Canyon No. 4 Mine may be particularly important to doves -- but not in large numbers.

Raptors observed by wildlife consultants are the Golden Eagle Aquila chrysaetos, Red-tailed Hawk Buteo jamaicensis, Goshawk Accipiter gentilis, Sharp-shinned Hawk A. striatus, American Kestrel Falco sparverius, and Great Horned Owl Bubo virginiana. In addition, mine personnel reported seeing Screech Owl Otus asio along the MillFork mixed riparian zone. All of these species are likely

10.3.2.4 Birds (continued)

to breed in or near the permit area, based on habitats available, observations during the nesting season.

Redtails frequently were seen soaring along the ridge above the mine, probably hunting in the open PJ and Sagebrush Grassland habitat types. No nest was located, but aggresive behavior by an adult Redtail in late June 1981 indicated a probable nest site in dense conifers across Mill Fork Canyon from the mine.

Adult Sharpshinned Hawks were routinely encountered in the riparian zone and adjacent north-facing conifers in lower Mill Fork Canyon. Adult Kestrels (one male, one female) were generally seen in the same area, except across the stream in more open south-facing habitats. Typical nesting habitat for the Sharpshinned consists of deciduous or coniferous trees and brush, while Kestrels more often prefer cliff sites. Both of these habitats occur along Mill Fork Canyon, and it therefore seems likely that these two species bred in the study area.

Great Horned Owls probably are fairly common, but owls are easily overlooked, and only one bird was actually observed. Its presence in appropriate habitats (riparian forest) in the breeding season (late April) suggests that the Great Horned Owl is a breeding resident.

10.3.2.4 Birds (continued)

Goshawks were observed only in higher elevation conifer-meadow mosaics west of the permit area. Only one Golden Eagle was seen --an adult gliding from west to east along the ridgetops above the mine in late April. Goshawks generally nest in large aspen or conifers, while Golden Eagles prefer cliff sites, such as available along Huntington Canyon.

Figure 10-8 shows areas of heaviest raptor use, including probable nesting areas.

During a separate raptor survey conducted for Beaver Creek Coal Company in the nesting season (Springer and Truettt 1980), six inactive stick nests were found in the study area. Of these, four were dilapidated, one appeared to have been used in 1979, and one had been improved in 1980 but was not used. All of the nests were on cliffs on the north side of Mill Fork Canyon. Based on the size of ther nests, Springer and Truett (1980) judged that they were too small for Golden Eagles and instead had been used by Red-tailed Hawks, Great Horned Owls, and/or Common Ravens Corvus corax.

DWR (1981a) classifies the study area as "substantial" habitat for these species, as well as for others potentially present but not observed (Appendix Table 10-9). U.S. Fish and Wildlife Service raptor specialists Ron Joseph and Bruce Waddell

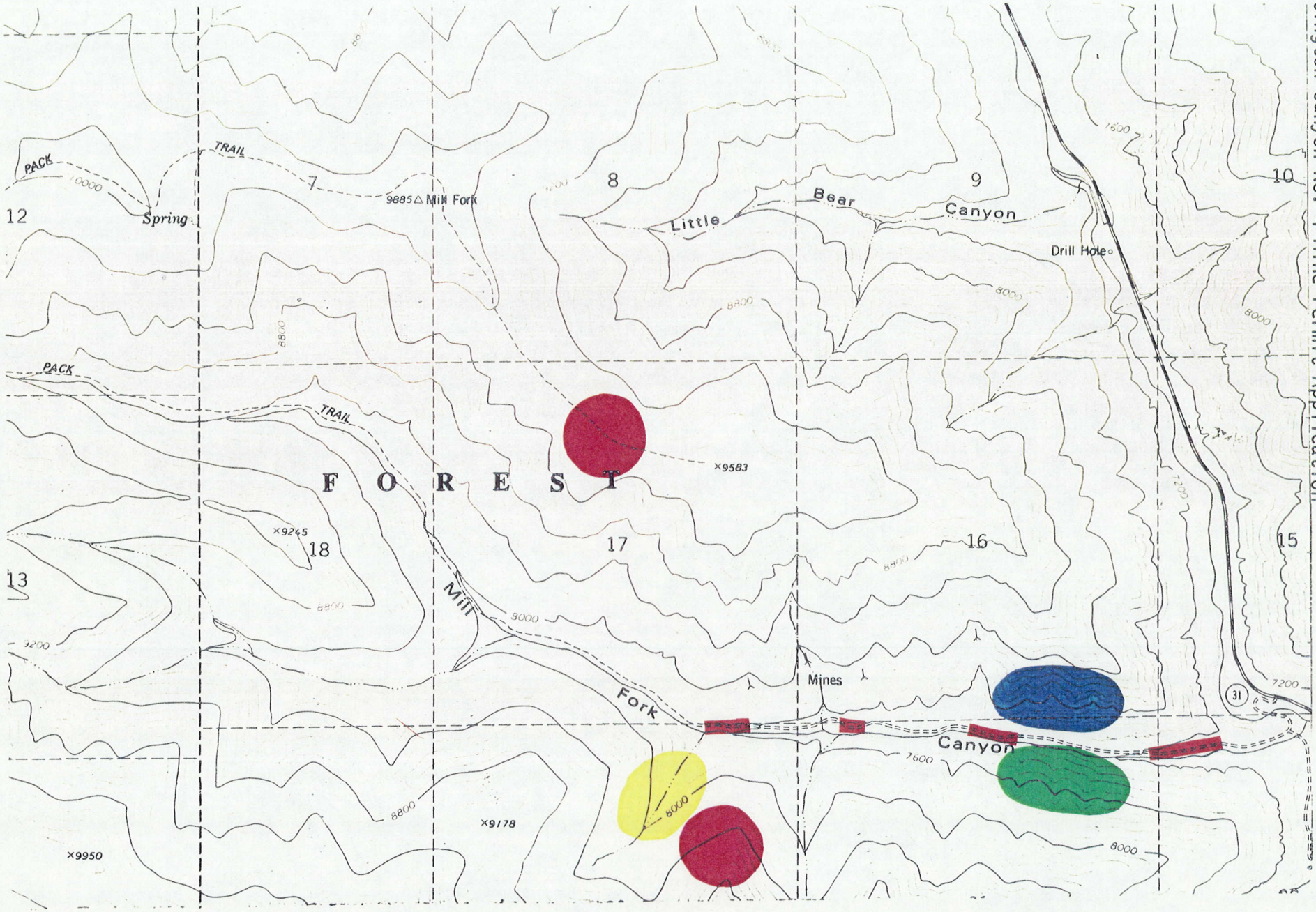

Figure 10-8. Areas of frequent occurrence, and hence possible breeding, by Red-tailed Hawks (red), Sharp-shinned Hawks (green), American Kestrels (blue), and Great Horned Owls (yellow) in the study area, 1981. Red strips along the Mill Fork road represent areas of frequent deer

10.3.2.4 Birds (continued)

visited the study area in August 1981, during which they confirmed that, while the cliffs along Mill Fork provide suitable nest sites, the general area lacks sufficient hunting habitat for intensive use by eagles, large falcons, and most buteos.

Raptors are of particular concern to DWR for three principal reasons. First, they are predators on small mammals and hence important in maintaining ecosystem balance.

Second, because they are high-order predators and have large home ranges, they are valuable indicators of environmental stress, sensitive to disturbance from rather far-removed activities, and consequently logical keystone species in ongoing monitoring programs. Third, the public at large is interested in raptors and therefore exerts considerable pressure for their protection.

Although public and regulatory concern is focused on gamebirds and raptors, small birds comprise the vast majority of species and avian biomass present in virtually any ecosystem. Approximately 125 species of small birds are potentially present in the study area (Appendix Table 10-9),

10.3.2.4 Birds (continued)

including cuckoos, frogmouths, swifts, hummingbirds, flycatchers, and songbirds.

Aspen Forests provide habitat for the largest number of small birds, particularly hole-nesting species for which aspen are especially attractive owing to their soft wood. Typical breeding species include the Common Flicker Colaptes auratus, Hairy Woodpecker Picoides villosus, Downy Woodpecker P. pubescens, Yellow-bellied (Red-naped) Sapsucker Sphyrapicus varius nuchalis, Western Wood Pewee Contopus sordidulus, Western Flycatcher Empidonax difficilis, Dusky Flycatcher E. oberholseri, Violet-green Swallow Tachycineta thalassina, Tree Swallow Iridoprocnebicolor, Black-capped Chickadee Parus atricapillus, Mountain Chickadee P. gambeli, White-breasted Nuthatch Sitta carolinensis, House Wren Troglodytes aedon, American Robin Turdus migratorius, Mountain Bluebird Sialia currucoides, Townsend's Solitaire Myadestes townsendii, Warbling Vireo Vireo gilvus, Yellow-rumped Warbler Dendroica cornoata, and Gray-headed Junco Junco caniceps. Coniferous Forest habitats supported almost as many small bird species, with regular breeding inhabitants including the Hairy Woodpecker, Olive-sided Flycatcher Nuttallornis borealis, Hammond's Flycatcher Empidonax hammondii, Steller's Jay Cyanocitta stelleri,

10.3.2.4 Birds (continued)

Clark's Nutcracker Nucifraga columbiana (at higher elevations) Mountain Chickadee, Red-breasted Nuthatch Sitta canadensis, Pygmy Nuthatch S. pygmaea (at lower elevations), Ruby-crowned Kinglet Regulus calendula, Solitary Vireo Vireo solitarius (at lower elevations), Yellow-rumped Warbler, Western Tanager Piranga ludoviciana, Gray-headed Junco, Chipping Sparrow Spizella passerina, Red Crossbill Loxia curvirostra, and Pine Siskin Carduelis pinus.

Mixed Riparian zones included many elements of both the aspen and conifer stands described above, plus a number ofspecies endemic to the tall mesic shrubs or the mixture of tall shrubs, conifers, and deciduous trees. Essentially endemic species were the Willow Flycatcher Empidonax traillii, Gray Catbird Dumetella carolinensis, Swainson's Thrush Catharus ustulatus, Orange crowned Warbler Vermivora celata, Yellow Warbler Dendroica petechia, MacGillivray's Warbler Oporornis tolmiei, Wilson's Warbler Wilsonia pusilla, Black-headed Grosbeak Pheucticus melanocephalus, Rufous-sided Towhee Pipilo erythrophthalmus, and Song Sparrow Melospiza melodia. Especially common birds from the aspen and conifer habitats included the Downy Woodpecker, Yellow-bellied Sapsucker, Western Flycatcher, American Robin, Townsend's

10.3.2.4 Birds (continued)

Solitaire, Mountain and Black-capped Chickadees, House Wren, Warbling Vireo, Yellow-rumped Warbler, and Western Tanager.

Pinyon/Juniper stands, which form the vegetational cover throughout most of the mine affected area, had a relatively depauperate avifauna compared to the more mesic types -- but typical of PJ stands in the region. Endemic species in this habitat type were the Pinyon Jay Gymnorhinus cyanocephalus, Plain Titmouse Parus inornatus, Rock Wren Salpinctes obsoletus, Blue-gray Gnatcatcher Polioptilacaerulea, Black-throated Gray Warbler Dendroica nigrescens, and Green-tailed Towhee Pipilo chlorura.

Tables 10-4 and 10-5 summarize plot surveys during the peak of the small bird breeding season in May 1981. Quantitative data were collected only for the Pinyon/Juniper and Mixed Riparian habitat types because other units are poorly represented in or adjacent to the affected area and the amount of data would therefore be too limited for reliability.

Although densities are reported as number of territorial males per hectare, plots censused actually were smaller. For the linear riparian zone plots were 100 m by 30 m (0.3

Table 10-4 Small bird breeding data, Mixed Riparian habitat type, Huntington Canyon No. 4 Mine, Emery County, Utah, May 1981.

Species	Density[1]	Frequency[2]	Relative[3] Abundance
Warbing Vireo	2.9	86	13.8
Yellow-rumped Warbler	2.4	50	11.4
Western Tanager	2.4	50	11.4
Hermit Thrush	1.4	42	6.7
Ruby-crowned Kinglet	1.4	42	6.7
House Wren	1.2	36	5.7
Hammond's Flycatcher	1.0	36	5.7
Western Flycatcher	1.0	28	4.8
Steller's Jay	1.0	28	4.8
Brown Creeper	0.7	21	3.3
Townsend's Solitaire	0.7	21	3.3
Orange-crowned Warbler	0.7	21	3.3
Wilson's Warbler	0.7	21	3.3
Chipping Sparrow	0.7	21	3.3
Willow Flycatcher	0.5	14	2.4
Mountain Chickadee	0.5	14	2.4
Black-capped Chickadee	0.5	14	2.4
Gray Catbird	0.5	14	2.4
American Robin	0.2	7	1.0
MacGillivray's Warbler	0.2	7	1.0
Pine Siskin	0.2	7	1.0
Total	21.0		100.0

[1]Number of breeding pairs (inferred from singing males) per hectare, n=14. Plot size = 100 m by 30 m.

[2]Percent of total plots in which each species occurred.

[3]Percent of total bird observations comprised by each species.

Table 10-5 Small bird breeding data, Pinyon/Juniper habitat type, Huntington Canyon No. 4 Mine, Emery County, Utah May 1981.

Species	Density[1]	Frequency[2]	Relative[3] Abundance
Solitary Vireo	0.6	30	13.0
Green-tailed Towhee	0.6	30	13.0
Dusky Flycatcher	0.5	25	10.9
Mountain Chickadee	0.5	25	10.9
Western Tanager	0.4	20	8.7
Yellow-rumped Warbler	0.4	20	8.7
American Robin	0.3	15	6.5
Ash-throated Flycatcher	0.2	10	4.3
Blue-gray Gnatcatcher	0.2	10	4.3
Rock Wren	0.2	10	4.3
Black-throated Gray Warbler	0.2	10	4.3
Chipping Sparrow	0.2	10	4.3
Plain Titmouse	0.1	5	2.2
Canyon Wren	0.1	5	2.2
Mountain Bluebird	0.1	5	2.2
Total	4.6		99.8

[1]Number of breeding pairs (inferred from singing males) per hectare, n = 20. Plot size = 100 m by 50 m.

[2]Percent of total plots in which each species occurred.

[3]Percent of total bird observations comprised by each species.

10.3.2.4 Birds (continued)

ha); for the steep PJ habitats, plots were 50 m by 100 m (0.5 ha). Additional data reported in the tables are frequency (the percentage of total plots in which each species occurred) and relative abundance (the percentage of total bird observations which each species comprises).

As can be seen from the two tables, the Mixed Riparian habitat type had both a high total density (21.0/ha), attributable to the diversity of nesting and foraging sites, and a large number of species (21). By contrast, the Pinyon/Juniper type, which comprises by far the greatest portion of the affected area, supported only fifteen species and 4.6 breeding pairs per hectare within the sample plots.

Winter residents included many of the breeding species listed above, plus large influxes of White-crowned Sparrows Zonotrichia leucophrys and Dark-eyed Juncos Junco hyemalis in virtually every habitat type. Appendix Table 10-9 provides additional information on species actually or potentially occurring in the study area.

No cold-blooded terrestrial vertebrates were observed during site-specific field studies, but three groups of species are expected in the study area. Xeric Sites, especially at lower elevations, provide habitat for several lizards and snakes, with the Collared Lizard Crotaphytus collaris, Fence

10.3.2.5 Reptiles and Amphibians

Lizard Sceloporus undulatus, Tree Lizard Urosaurus ornatus, Striped Whipsnake Masticophis taeniatus, and Racer Coluber constrictor most likely to be present in significant numbers. Mesic Sites, especially at higher elevations, probably are inhabited by a few snakes, most notably the Bullsnake Pituophis melanoleucus and Western Terrestrial Garter Snake Thamnophis elegans. Aquatic Sites, including ponds and wet meadows, could be utilized for breeding by amphibians such as the Tiger Salamander Ambystoma tigrinum, Western Toad Bufo boreas, and Western Chorus Frog Pseudacris triseriata. As noted in other sections of this report, however, surface water is limited in the study area, and habitat for amphibians is marginal at best.

Appendix Table 10-10 provides a complete list of herptiles in the Wasatch Plateau region and potentially present in the study area.

10.3.2.6 Aquatic Organisms

No fish were seen or collected in either Mill Fork or Little Bear Creek, and it is doubtful that fish could survive either of these small streams, although individuals may move a short distance into both during periods of peak runoff. However, this occurrence would be transitory because the fish would migrate back to Huntington Creek as water levels receded.

10.3.2.6 Aquatic Organisms (continued)

The benthic macroinvertebrate community of Mill Fork was surveyed in November 1980 and April 1981 at stations above (MF-1), opposite (MF-2), and below (MF-3) the existing Huntington Canyon No. 4 Mine. The results of these surveys, and coincident water quality and habitat quality evaluations, are summarized in the following subsections.

Site MF-1 was located during the fall survey at the confluence of Mill Fork and an unnamed tributary about 460 m upstream of the western permit area boundary. This stretch of the stream consisted of several small pools connected by riffles. Mean pool depth was 18 cm, mean riffle depth was 4 cm and stream width was 1.5 m, or less. Rubble and gravel were the primary substrate components of riffles, while pools contained a mixture of rubble, gravel, sand, and silt as well as deciduous leaf packs were in the pools. Mean water velocity of the riffles was about 15 cm/sec. Spruce and fir along the creek provided a dense canopy and the stream banks were retained by grasses.

Eighteen aquatic invertebrate taxa were captured in two Surber samples. The midge Chironomidae was the abundant organism (50 percent) but oligochaetes, young stonefly instars, the stonflies Malenka and Pteronarcella badia, the caddisfly Hesperophylax, and the flies Atherix variegata and Simuliidae were moderately common (Table 10-6). The water was moderately alkaline, and dissolved oxygen was 10.1 mg/l. Water temperature was 1.0 C (Table 10-7).

Table 10-6 Aquatic invertebrates collected from Mill Fork Creek, 18 November 1980 and 26-27 April 1981, and Little Bear Creek, 27 April 1981, Emery County, Utah.

Organism	Site[1] MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Turbellaria					4	2.8								
Tricladia														
Planariidae														
Polycelis coronata			59	6.6			1	4.2						
Nematoda					1	0.7								
Oligochaete	52	10.6	2	0.2	30	21.3	2	8.3	2	1.5			18	6.5
Ostracoda	3	0.6	52	5.8					1	0.8				
Copepoda			1	0.1										
Hydracarina									1	0.8				
Insecta														
Plecoptera														
Young instars	47	9.6			15	10.6								
Nemouridae											24	32.9		
Malenka sp.	18	3.7							10	7.6				
Perlodidae														
Isoperla sp.									18	13.6	1	1.4	1	0.9

[1]The sites are those above, opposite, and below the Huntington Canyon No. 4 Mine on Mill Fork (MF-1, MF-2, and MF-3, respectively) in both 1980 and 1981, and on Little Bear Creek (LB-1) in 1981. Values reported are total numbers per taxon per site (#) and percent relative abundance (%).

Table 10-6 (cont.)

Organism	Sites MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Pteronarcidae														
Pteronarcella badia	47	9.6	1	0.1	15	10.6								
Ephemeroptera														
Baetidae														
Baetis sp.	8	1.6					2	8.3	46	34.8	3	4.1	49	45.0
Siphlonuridae														
Ameletus sp.	3	0.6	31	3.4	17	12.1	3	12.5	10	7.6	1	1.4		
Ephemerellidae														
Ephemerella sp.			6	0.7	1	0.7					1	1.4		
Ephemerella grandis	1	0.2							1	0.8				
Ephemella doddsi					1	0.7								
Heptageniidae														
Heptagenia sp.	3	0.6			19	13.5			8	6.1				
Epeorus sp.							1	4.2			4	5.5	1	0.9
Cinygmula sp.			23	2.6			6	25.0					5	4.6
Hemiptera														
Hebridae														
Hebrus sp.	1	0.2												
Trichoptera														
Polycentropodidae							1	4.2						
Limnephilidae														
Hesperophylax sp.	22	4.5	33	3.7	15	10.6	3	12.5	11	8.3	2	2.7	4	3.7
Rhyacophilidae														
Rhyacophila sp.			1	0.1					1	0.8			2	1.8
Hydropsychidae														
Hydropsyche sp.									1	0.8				

Table 10-6 (cont.)

Organism	Sites MF-1(80) #	%	MF-1(81) #	%	MF-2(80) #	%	MF-2(81) #	%	MF-3(80) #	%	MF-3(81) #	%	LB-1 (81) #	%
Diptera														
Empididae							1	4.2	1	0.8				
Chironomidae	247	50.3	660	73.4	15	10.6	3	12.5	5	3.8	30	41.1	17	15.6
Ceratopogonidae			6	0.7	3	2.1					1	1.4	1	0.9
Tipulidae														
Tipula sp.	3	0.6			1	0.7			3	2.3				
Helius sp. or Ormosia sp.					1	0.7								
Ormosia sp.			22	2.4										
Dicranota sp.			2	0.2							4	5.5	4	3.7
Hexatoma sp.									2	1.5	2	2.7	5	4.6
Dixidae														
Dixa sp.	1	0.2							1	0.8				
Athericidae														
Atherix variegata	16	3.3			1	0.7			10	7.6				
Anthiomyidae														
Limnophora aequifrons	2	0.4			1	0.7								
Simuliidae	15	3.1			1	0.7								
Gastropoda														
Planorbidae (old shells)	2	0.4												
Gyraulus sp.							1	4.2						
Pelecypoda														
Sphaeriidae														
Total Number Taxa	**18**		**14**		**17**		**11**		**18**		**11**		**12**	
Total Number Organisms	**491**		**899**		**141**		**24**		**132**		**73**		**109**	

Table 10-7 Physicochemical water characteristics of sampling sites on Mill Fork, 17 november 1980, and 26-27 April 1981, and Little Bear Creek, 27 April 1981, Emery County, Utah.

Parameter	Sites[1] MF-1(80)	MF-1(81)	MF-2(80)	MF-2(81)	MF-3(80)	MF-3(81)	LB-1 (81)
Dissolved Oxygen (mg/l)	10.1	6.8	5.8	8.0	10.2	7.3	7.6
Alkalinity (mg/l)	----	----	----	291.0	----	308.2	256.8
Hardness (mg/l)	----	428.0	----	359.5	----	513.6	393.8
pH	8.4	7.8	7.3	8.5	7.4	8.5	8.6
Conductivity (micro mhos/cm)	310	----	415	----	310	----	----
Temperature (C)	1.0	4.0	4.0	3.5	0.9	5.5	5.0

[1]The sites are those above, opposite, and below the Huntington Creek No. 4 Mine on Mill Fork (MF-1, MF-2, and MF-3, respectively) in both 1980 and 1981, and on Little Bear Creek (LB-1) in 1981.

10.3.2.6 Aquatic Organisms (continued)

Lack of surface flows at Site MF-1 during the following spring survey necessitated relocating the site about 0.9 km downstream. In this area the stream consisted of one pool (about 3 m by 5 m by 30 cm deep) and a shallow riffle-run (about 5 cm deep) below the pool. The small rubble and sand substrate of the creek was overlain with fine sediments, most likely dust and eroded soils from the adjacent access road. Several culverts directed run-off from the road to the stram. Riparian vegetation provided a fairly dense canopy over the creek, and the stream contained leaf litter and small limbs.

The Surber samples taken from the pool and riffle-run contained fourteen taxa. The midge Chironomidae was the most common aquatic invertebrate (73.4 percent). The planarian Polycelis coronata, the mayflies Ameletus and Cinygmula, the caddisfly Hesperophylax, and the cranefly

Ormosia were moderately abundant (Table 10-6). Alkalinity was rather high (428 mg/l), but other parameters were not unusual (Table 10-7).

Site MF-2 was located in 1980 opposite the active mine area and about 30 m upstream of a small settling pond. This stretch consisted of pools connected by riffles. Gravel was the primary substrate component of the riffles, while the substrate of the pools was mainly sand with a silt

10.3.2.6 Aquatic Organisms (continued)

overburden. Riffles and pools were about 1.2 m wide and had mean depths of 4.5 cm and 13.5 cm, respectively. Water velocity of the riffles was about 7-8 cm/sec.

Oligochaetes were the most numerous (21.3 percent) of the seventeen aquatic intertebrate taxa collected at MF-2. Young stonefly instars, the stonefly Pteronarcella badia, the mayflies Ameletus and Cinygmula, the caddisfly Hesperophylax, and the midge Chironomidae each had at least fifteen representatives (Table 10-6). The water was warmer at MF-2 than MF-1 in 1980. Dissolved oxygen was significantly lower than at MF-1 and the pH was slightly higher (Table 10-7).

In 1981 this site was located at approximately the same point as it was in 1980. In 1981, the flow pattern was primarily riffle-run and no true pools were noted. The substrate was mainly hard-packed clay with rubble evenly distributed over the clay, a fine layer of silt covered the substrate. In this stretch the stream occupied a narrow channel (about 0.4 m) and flowed through a deeply cut ravine (about 2 m to 3 m). Cottonwood and aspen provided a moderately complete canopy and cottonwood leaf packs were lodged among the rubble.

The two aquatic invertebrate samples yielded only 24 specimens of eleven taxa. Cinygmula sp. was the most

10.3.2.6 Aquatic Organisms (continued)

common organism (25.0 percent). All other taxa were represented by three or fewer individuals (Table 10-6).

Dissolved oxygen was higher (8.0 mg/l) than at MF-1 and alkalinity was lower (359.5 mg/l). Other physicochemical parameters were not unusual (Table 10-7).

Site MF-3 was located about 1.8 km above the confluence of Mill Fork and Huntington Creek in November 1980. Pool habitat was slightly more prevalent than riffle. Pools averaged about 1.2 m wide and 16.8 cm deep; riffles varied from about 0.5 m to 1.5 m wide and were about 4.8 cm deep. Riffle substrate was mainly gravel with some rubble. The pools had a sand-gravel substrate overlaid with silt and abundant leaf litter. Water velocity in the riffles was about 15 cm/sec. The riparian vegetation provided a rather dense canopy. The site the creek was covered with ice from about 100 m below MF-3 to its juncture with Huntington Creek.

The mayfly Baetis was the most abundant of the eighteen taxa collected in two Surber samples at MF-3 in 1980. Six other taxa (Malenka sp., Isoperla sp., Ameltus sp., Heptagenia sp., Hesperophylax sp., and Atherix variegata) were moderately common (Table 10-6). Water temperature, dissovled oxygen, and conductivity at MF-3 were more similar to readings obtained at MF-1 than MF-2 in 1980, while the pH of MF-3 was more similar to MF-2 than MF-1 (Table 10-7).

10.3.2.6 Aquatic Organisms (continued)

Because of changes in discharge, MF-3 was moved about 0.6 km farther downstream in April 1981. Water flowed only a short distance (less than 0.3 km) in the vicinity of MF-3 and disappeared about 15 m below the site. The substrate in this stretch was primarily sand and small gravel and silt covered all substrate components. Riffle-run was the main flow pattern, but several small (about 0.5 m by 0.5 m) plunge basins had been formed by debris dams. Water velocity did not exceed 15 cm/sec in the riffles. Organic debris in the area was less than at the more upstream sites during the spring survey, and riparian vegetation provided an incomplete canopy.

Eleven aquatic invertebrate taxa were collected in four samples at MF-3 in 1981. The stonefly Neumouridae and the ~~stonefly Nemouridae and the~~ midge Chiromidae were the most common organisms (32.9 and 41.1 percent, respectively). All other forms were present in low numbers (Table 10-6).

LB-1, the sample station for Little Bear Creek in 1981, was located about 300 m upstream from the confluence with Huntington Creek. Note: Water is removed from the headwater spring and diverted into a 12 in. pipe by the town of Huntington. Construction of the pipeline did not appear to have caused introduction of disturbed soil into the creek

10.3.2.6 Aquatic Organisms (continued)

when the stream was visited. However, the diversion of water from the spring results in lower flows than would occur naturally. Nonetheless, surface flows in Little Bear Creek were greater than in Mill Fork in April 1981. The stream alternated between a single channel and a braided network. The substrate was primarily bedrock with some gravel. For much of its course the stream was heavily shaded by conifers and deciduous shrubs.

Twelve aquatic invertebrate taxa were obtained in two Surber samples. Baetis sp. was the most common organism (45.0 percent), while Oligochaetes and chironomids were moderatley abundant (16.5 and 15.6 percent, respectively) (Table 10-6). The rather low pH at LB-1 reflected the moderately high hardness (393.8 mg/l) of the water. The high hardness was also evidenced by a calcareous coating on twigs and exposed roots submersed below the waterline. Dissolved oxygen and water temperature readings were not unusual (Table 10-7).

Overall, the aquatic macroinvertebrate community of Mill Fork in the study area was more diverse in fall 1980 than in spring 1981. The principal reason for this probably is that surface flows were greatly reduced in April, and Mill Fork therefore provided less total available habitat. The somewhat greater permanence of running water in the upper portions of Mill Fork are reflected in higher numbers in aquatic organisms (Table 10-6).

10.3.2.6 Aquatic Organisms (continued)

Aside from the low numbers related to persistence of flow, the benthic macroinvertebrate community of both Mill Fork and Little Bear Creek were typical of small mountain streams in the region. The major taxa are adapted to low flows, and the few permanent pools provide a source for active or inactive repopulation of sections subject to seasonal desiccation.

10.3.3 Species of Special Significance

In addition to the prevalent terrestrial vertebrates described above, including those listed by DWR as being of high priority to Utah, are a number of species which are of special significance for legal reasons. These include species listed by FWS as "threatened" or "endangered" at the national level or as "Migratory Birds of High Federal Interest."

10.3.3.1 Threatened and Endangered Species

Listed "t and e" species potentially present in the study are the American Peregrine Falcon Falco peregrinus anatum, which breeds in Utah; Arctic Peregrine Falcon Falco peregrinus tundrius, which migrates through Utah; and Bald Eagle Haliaeetus leucocephalus, which winters in Utah.

10.3.3.1 Threatened and Endangered Species

None of the species is likely to occur, because habitats in the area are marginal. However, areas of potential occurrence include riparian forests along Huntington Canyon for the Bald Eagle, cliff areas in the region for the American Peregrine Falcon, and upland areas for the Arctic Peregrine Falcon.

10.3.3.2 Migratory Birds of High Federal Interest

This group of especially significant species is comprised of 22 bird species identified by FWS as occurring in the Uintah-Southwestern Utah Coal Production Region (see Section 10.2.2.2 above for a summary of criteria used in compiling this list):

1. Bald Eagle
2. Golden Eagle
3. Ferruginous Hawk
4. Cooper's Hawk
5. Peregrine Falcon
6. Prairie Falcon
7. Merlin
8. Osprey
9. Spotted Owl
10. Burrowing Owl
11. Flammulated Owl
12. Sandhill Crane
13. Great Blue Heron
14. Long-billed Curlew
15. Band-tailed Pigeon
16. Pileated Woodpecker
17. Williamson's Sapsucker
18. Lewis' Woodpecker
19. Black Swift
20. Western Bluebird
21. Scott's Oriole
22. Grace's Warbler

10.3.2.2 Migratory Birds of High Federal Interest (continued)

Based on information provided by DWR (1978, 1981a) and site-specific field surveys, ~~five of these species are actually or potentially specific field surveys,~~ five of these species are actually or potentially present in the study area, besides the Bald Eagle, Golden Eagle, Peregrine Falcon, and Band-tailed Pigeon previously discussed in this report.

The most likely raptors are the Cooper's Hawk Accipiter cooperii and Flammulated Owl Otus flammeolus, both of which occur in the Wasatch Plateau and prefer wooded country, such as in Mill Fork and Little Bear Creek Canyons. DWR (1981a) has reported the study area as providing substantial habitat for Prairie Falcons Falco mexicanus as well. However, the distance from potential nest sites on cliff faces in the area to expansive grassland hunting habitats -- and the existing levels of human activity --probably preclude this species from utilizing the site and vicinity.

Williamson's Sapsucker Sphyrapicus thyroideus was determined to breed near the study area during the site-specific field studies. The presence of this species is not surprising, because the open aspen/conifer mosaic provides preferred nesting habitat (Crockett and Hadow 1975, Crockett and Hansley 1978), and it has been reported as breeding in "all the mountainous counties of the state" (Hayward et al. 1976:120). Although no nests were located, the status of Williamson's Sapsucker as a breeder was

10.3.3.2 Migratory Birds of High Federal Interest (continued)

inferred from observations of courting adults in spring and juveniles (in the same area) in late summer. The area in which the sapsuckers were observed was an open aspen stand between Mill Fork and a PJ slope about 2 km west of the permit boundary in Section 17.

The Black Swift Cypseloides niger also breeds in the Wasatch Plateau (DWR 1978), generally on cliff sites near or behind a waterfall. The near absence of mesic cliff sites in the study area greatly reduces the likelihood that the Black Swift is present as a breeder. However, it would not be surprising for Black Swifts to use the area for hunting, because they are wide-ranging in their search for insect prey. White-throated Swifts Aeronautes saxatalis were common along cliffs in the study area, but this species is of no special status in Utah.

The Western Bluebird Sialia mexicana is the other listed species which would not be particularly surprising in the study area, based on known occurrence elsewhere in the Wasatch Plateau and habitat preference (i.e., open conifers, from pinyon/juniper to spruce/fir). This species most likely would occur as isolated pairs in the breeding season or as small flocks at lower elevations in the winter; none was observed during field studies. As noted previously, the closely related Mountain Bluebird is an uncommon resident in the study area, utilizing aspen cavities for breeding and open pinyon/juniper for winter foraging.

10.4 Potential Impacts on Fish and Wildlife

Wildlife impacts typically can be categorized into three groups: loss or modification of habitat, disturbance, and mortality.

The limited amount of surface distrubance associated with the Huntington Canyon No. 4 Mine will result in a total habitat loss of about 78 acres during the life of the mine. With the mine in existence, this loss of habitat has already occurred. Virtually all of the mine activity is confined to the Pinyon/Juniper/Mountain Mahogany habitat type, and it does not appear that this loss of habitat has had a significant impact on wildlife in the permit area.

Disturbance of furtive species results from the levels of noise and activity associated with an operational mine. Thus, most larger species of birds and mammals (including, for example, deer, carnivores, and raptors) tend to avoid the mine site, at least during working hours. Most of these species are likely to move freely around the mine site on weekends and to quickly re-inhabit the area after decommissioning.

Two types of mortality potentially are associated with operation of the Huntington Canyon No. 4 Mine: raptor electrocutions on unsafe power poles and mammal roadkills. A raptor hazard survey was conducted for Beaver Creek Coal Company in conjunction with baseline field studies. The results of this survey indicate that the raptor hazard is slight, because (1) most poles utilize a relatively safe armless configuration, (2) the positioning of the poles relative to adjacent topography would tend to limit use, (3) most of the raptors commonly present in the area are not frequent users of powerline perches, and (4) the least safe pole designs are near the active mine, where raptor use probably is minimal. Figure 10-9 shows the most common pole configuration on the distribution line along Mill Fork Canyon.

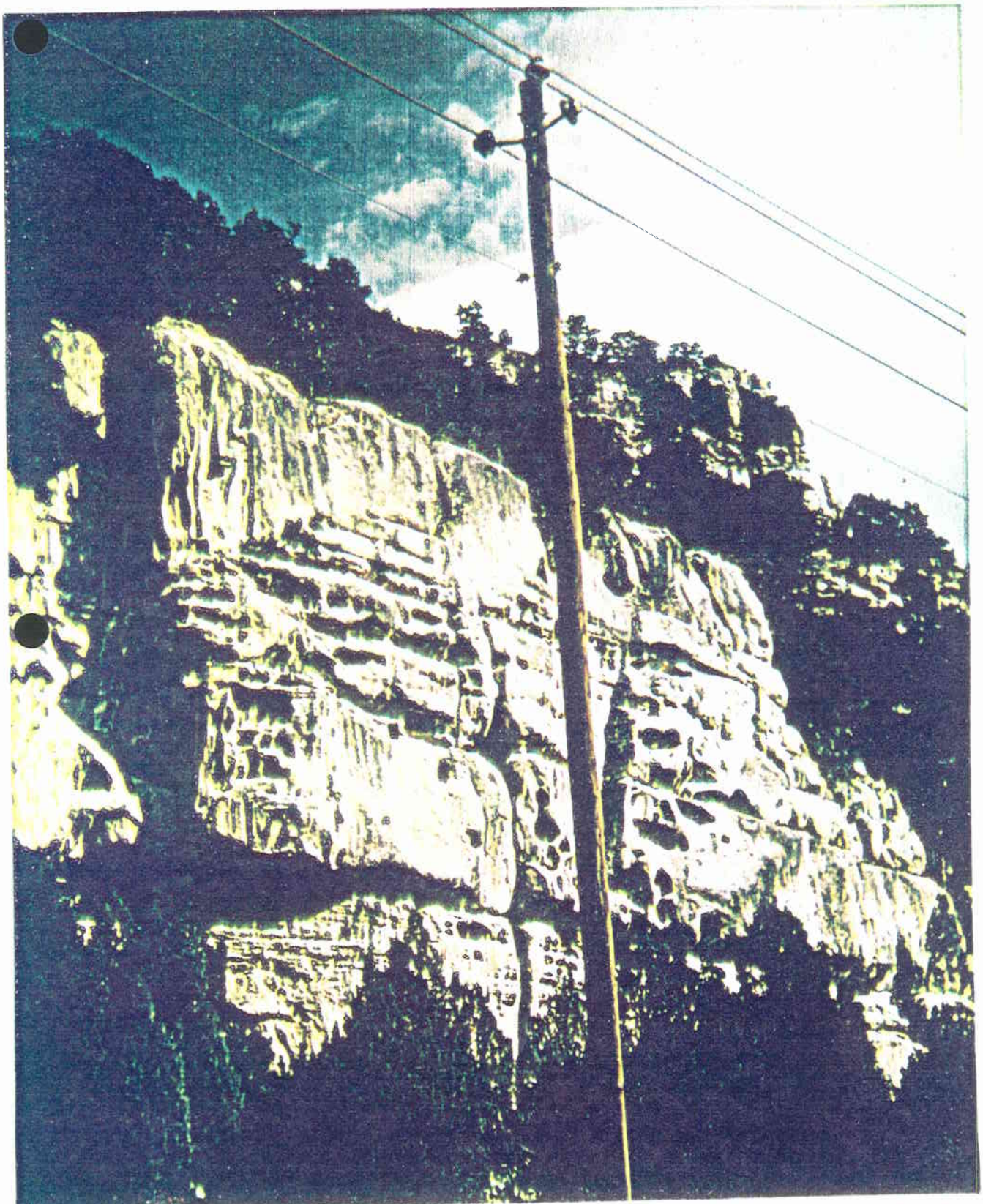

Figure 10-9. The most common powerpole configuration on the distribution line along Mill Fork Canyon. The cliff face in the background is an effective barrier to deer movement between Mill Fork and south-facing slopes along most of its length.

10.4 Potential Impacts on Fish and Wildlife (continued)

Mule Deer roadkills along the Mill Fork access and haulage road have been monitored by Beaver Creek Coal Company; to date, no roadkills have been reported. This is not surprising, because a steep cliff face along most of its length serves as an effective barrier to deer movement (Figure 10-9). Road crossing surveys were conducted during the winter of 1980-81 to investigate the potential problem of deer-vehicle collisions along the Mill Fork access and haulage road by identifying preferred deer crossing sites. The major deer crossing, accounting for 13 of the 23 sets of tracks observed, was near the confluence of Mill Fork and Huntington Canyon in the extreme northwestern part of Section 22 (Figure 10-8). A number of other deer crossing sites, generally associated with minor side drainages such as the boundary of Sections 16 and 21, were used less frequently. These crossings accounted for only about 40 percent of the actual tracks recorded.

Overall, the roadkill risk is higher in the early morning and late afternoon/early evening, when deer are most active. The greatest hazard is in late winter, when deer are likely to move regularly between south-facing slopes and the riparian zones -- and thus across the Mill Fork Canyon access/haul road. Crossing peaks also are expected to coincide with seasonal migrations between summer range and winter range, which tend to be concentrated along topographic funnels such as major drainages. However, this represents a fairly brief period, whereas winter range along Mill Fork is occupied for periods of up to a few months.

Beaver Creek Coal Company also has monitored roadkills along the Huntington Canyon Road, with a total of three deer collisions reported between the access road turnoff and the Huntington Canyon Powerplant

10.4 Potential Impacts on Fish and Wildlife (continued)

between May 1980 and May 1981; two involved Beaver Creek Coal Company employees or coal haulage contractors. All of the collisions occurred in late winter/early spring, coinciding with the season of highest deer concentration at the lower elevations of the study area.

Field investigations indicate that the most severe impact to terrestrial wildlife in the study area has been intensive and apparently prolonged overgrazing by domestic herbivores. The decrease in the total production and quality of forage limits the carrying capacity of both large and small mammals, and hence for predators that depend on them for food.

Impacts to aquatic ecosystems also have been minor. Moreover, water quality, habitat quality, and macroinvertebrate studies revealed no indications that Mill Fork has sustained any diminution in overall value as a result of the operation of the Huntington Canyon No. 4 Mine. The only apparent effect has been the addition of fine particles wafting or washing into the creek from the adjacent access road. Even this, however, has had far less influence on the Mill Fork ecosystem than the inherently low and variable flows.

Little Bear Creek has been unaffected by mining, but water diversion near its headwaters by the town of Huntington has resulted in lower than natural flows. This small stream is expected to remain unimpacted if underground mining is extended into Little Bear Canyon, unless the channel is disturbed by subsidence.

10.4 Potential Impacts on Fish and Wildlife (continued)

Because Mill Fork and Little Bear Creek have been essentially unaffected by the mining operation, and should remain so, Huntington Creek is also essentially unaffected. The greatest potential risk is the inflow of sediments following a high intensity precipitation event or unusually high spring runoff. Mitigation measures already incorporated into the operational design of the Huntington Canyon No. 4 Mine have substantially reduced the likelihood of this potential impact (see the following section).

10.5 Mitigation and Management Plans

As noted in the preceding sections of this report, the Huntington Canyon No. 4 Mine is an existing operation, for which no major additional surface disturbances presently are planned. Therefore, the mitigation and management plans focus on minimizing impacts related to continued mining activities and facilitating rapid return of the site to suitable habitat after decommissioning.

Many of the mitigation and impact avoidance procedures utilized in the following sections have been drawn from information provided to Beaver Creek Coal Company by DWR (1981b). A number of these measures also were proffered by Beaver Creek Coal Company in their interim submittal to DOGM, which was prepared prior to receipt of DWR's document.

DWR (1981b) emphasized three basic aspects to mitigation and impact avoidance for the terrestrial habitats at the Huntington Canyon No. 4 Mine: habitat and wildlife protection, reclamation, and wildlife management.

10.5.1 Terrestrial Habitats and Wildlife

Habitat protection measures center on avoiding especially important or sensitive areas, such as riparian zones, and not using persistent pesticides, which would diminish the long-term health of an ecosystem.

Reclamation is particularly important as a means of controlling erosion and restoring disturbed areas to productive wildlife habitat.Recommended procedures in achieving the reclamation goal include (1) planting a diverse mixture of native grasses, forbs, and (where appropriate) woody species, (2) using seedling stock rather than relying solely on seeds for trees or shrubs, (3) actually transplanting stock or turf from new disturbed sites to reclaimed sites, and (4) leaving islands of natural vegetation in new disturbed sites.

Wildlife management is important for minimizing harmful effects (e.g., fencing animals out of areas containing toxic substances) and preventing damage to newly reclaimed areas (e.g., excluding large herbivores and possibly controlling rodents). Specific types of mitigation, impact avoidance, and wildlife management procedures recommended by DWR (1981b) and Beaver Creek Coal Company consultants include the following.

10.5.1.1 Mammals

For small mammals, most of which are secretive and have small home ranges, mitigation will be almost totally related

10.5.1.1 Mammals (continued)

to habitat protection and reclamation -- i.e., ways of minimizing short- and long-term habitat loss. For larger species, such as big game carnivores and ungulates, the problem is complicated by their large home ranges, seasonal movements, and sensitivity to disturbance.

Disturbance-related impacts will be mitigated to a significant extent by Beaver Creek Coal Company policies against harassing or hunting wildlife in the permit area. These policies will continue throughout the operation of the mine. Further, "employee awareness" programs will specifically inform mine personnel of especially sensitive periods or habitats, such as deer fawning seasons and areas, bear dens, critical winter areas, and so forth. Roadkills will be minimized by an employee awareness program, and reminders at critical seasons (e.g., late winter). In addition, these sensitive aspects of the ecosystem will be avoided during future exploration, operation, and reclamation activities.

10.5.1.2 Birds

Like small mammals, songbirds and other small species are most sensitive to habitat loss, and mitigation will therefore focus on habitat protection and reclamation. In addition, active nests or nest trees will not be disturbed.

10.5.1.2 Birds (continued)

For raptors and gamebirds, which like large mammals are more wide-ranging and susceptible to disturbance, an employee awareness program will ensure that active nests or other "crucial-critical" use areas are avoided during the sensitive season and that the birds are not harassed or killed. The potential raptor electrocution hazard posed by some powerline pole configurations has been determined by U.S. Fish and Wildlife Service raptor biologist Ron Joseph to not require corrective modification (see Section 10.4 above).

10.5.1.3 Reptiles and Amphibians

Besides minimizing habitat loss and restoring native vegetation, the principal mitigation measures for heptiles will be to avoid killing individuals and to not disturb or destroy snake dens, amphibian breeding ponds, and other sensitive use areas.

10.5.2 Aquatic Habitats and Organisms

Habitat loss or deterioration of the Mill Fork aquatic ecosystem has been limited by establishing a 100 ft buffer strip adjacent to the stream and constructing sediment ponds to protect the stream from an increased sediment load from the mine affected area. Additional details of these procedures for protecting Mill Fork are provided in Sections 3.2.8, 3.2.9, and 7.2.3 of the mine permit application.

10.6 Stream Buffer Zone Determination

Beaver Creek Coal Company has committed to maintaining a 100 ft buffer zone along Mill Fork. This approach is expected to ensure that the stream channel and adjacent riparian vegetation will remain free of physical disturbance by the continued mining operation.

10.7 Fish and Wildlife Monitoring

Beaver Creek Coal Company will conduct a wildlife monitoring program throughout the operational life of the Huntington Canyon No. 4 Mine. The monitoring program will utilize the sevices of a full-time environmental specialist and, as necessary, professional consultants to evaluate the ongoing success of operational mitigation measures, ensure that threatened or endangered species and sensitive or critical use areas remain undisturbed by future activities, deal with any unforeseen difficulties which might arise, and participate in reclamation efforts upon completion of the project.

Three aspects of the monitoring program have already been initiated by Beaver Creek Coal Company: (1) monthly inspections of specific stations along Mill Fork to monitor sediment load, (2) routine reporting by coal haulage personnel of any roadkills along the access corridor, and (3) spring surveys of the site to locate -- and thus avoid -- active raptor nests.

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TABLE 10-8

Mammals in the Huntington Canyon No. 4 Mine Study Area
Emery County, Utah (1980-1981)

Species	Status	Relative Abundance*	Habitat Preference*
SORICIDAE			
Northern Water Shrew *Sorex palustris*	potential	uncommon	riparian
Merriam's Shrew *S. merriami*	potential	uncommon	ubiquitous
Vagrant Shrew *S. vagrans*	likely	common	riparian, meadows
Masked Shrew *S. cinereus*	likely	common	moist sites
Dusky Shrew *S. obscurus*	likely	common	conifers, meadows
VESPERTILIONIDAE			
Little Brown Myotis *Myotis lucifugus*	likely	common	caves, riparian
Small-footed Myotis *M. leibii*	likely	uncommon	caves, cliffs
Long-legged Myotis *M. volans*	likely	common	cliffs, trees
Long-eared Myotis *M. evotis*	likely	common	conifers
Fringed Myotis *M. thysanodes*	likely	uncommon	caves, cliffs
Yuma Myotis *M. yumanensis*	likely	uncommon	caves
California Myotis *M. californicus*	likely	common	caves, cliffs
Silver-haired Bat *Lasionycteris noctivagans*	likely	common	conifers
Western Pipistrelle *Pipistreilus hesperus*	likely	common	caves, cliffs
Big Brown Bat *Eptesicus fuscus*	likely	common	caves, cliffs
Red Bat *Lasiurus borealis*	likely	uncommon	conifers, riparian
Hoary Bat *L. cinereus*	likely	uncommon	conifers, riparian
Western Big-eared Bat *Plecotus townsendii*	likely	common	caves, cliffs

*Includes onsite observation and DWR regional information.

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
LEPORIDAE			
White-tailed Hare *Lepus townsendii*	potential	common	sagebrush, grassland
Snowshoe Hare *L. americanus*	likely	common	conifers, aspen
Black-tailed Hare *L. californicus*	potential	common	sagebrush, grassland
Mountain Cottontail *Sylvilagus nuttallii*	observed	common	conifers, pinyon/juniper
Desert Cottontail *S. audubonii*	potential	common	sagebrush, pinyon/juniper
SCIURIDAE			
Red Squirrel *Tamaisciurus hudsonicus*	observed	common	conifers
Rock Squirrel *Spermophilus variegatus*	observed	common	ubiquitous
Uintah Ground Squirrel *S. armatus*	observed	common	dry meadows
Golden-mantled Ground Squirrel *S. lateralis*	observed	common	ubiquitous
Northern Flying Squirrel *Glaucomys sabrinus*	potential	common	conifers
Yellow-bellied Marmot *Marmota flaviventris*	likely	common	rocky areas
Least Chipmunk *Eutamius minimus*	observed	common	ubiquitous
Uintah Chipmunk *E. umbrinus*	observed	common	ubiquitous
Cliff Chipmunk *E. dorsalis*	likely	common	pinyon/juniper
GEOMYIDAE			
Northern Pocket Gopher *Thomomys talpoides*	present	common	meadows

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
GEOMYIDAE (continued)			
Valley Pocket Gopher *T. bottae*	potential	common	meadows
HETEROMYIDAE			
Great Basin Pocket Mouse *Perognatuus parvus*	potential	common	pinyon/juniper
Ord's Kangaroo Rat *Dipodomys ordii*	potential	common	pinyon/juniper
CASTORIDAE			
Beaver *Castor canadensis*	potential	common	aquatic
CRICETIDAE			
Western Harvest Mouse *Reithrodontomys megalotis*	potential	common	sagebrush, grassland
Deer Mouse *Peromyscus maniculatus*	likely	abundant	ubiquitous
Canyon Mouse *P. crinitus*	likely	common	rocky areas
Brush Mouse *P. boylii*	likely	common	brushlands
Pinyon Mouse *P. truei*	likely	common	pinyon/juniper
Bushy-tailed Woodrat *Neotoma cinerea*	likely	common	ubiquitous
Muskrat *Ondatra zibethicus*	likely	common	aquatic
Meadow Vole *Microtus pennsylvanicus*	likely	common	meadows
Mountain Vole *M. montanus*	likely	common	meadows
Richardson's Vole	likely	common	meadows

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
CRICETIDAE (continued)			
M. richardsoni Long-tailed Vole *M. longicaudus*	likely	common	meadows, brushland
MURIDAE			
Norway Rat *Rattus norvegicus*	potential	common	mine areas
House Mouse *Mus musculus*	potential	common	mine areas
ZAPODIDAE			
Western Jumping Mouse *Zapus princeps*	likely	common	riparian, meadows
ERETHIZONTIDAE			
Porcupine *Erethizon dorsatum*	observed	common	wooded areas
CANIDAE			
Coyote *Canis latrans*	present	common	ubiquitous
Red Fox *Vulpes vulpes*	likely	common	ubiquitous
Gray Fox *Urocyon cinereoargenteus*	likely	common	riparian, conifers
URSIDAE			
Black Bear *Ursus americanus*	present	common	ubiquitous
PROCYONIDAE			
Ring-tailed Cat *Bassariscus astutus*	likely	common	riparian, brushland
Raccoon *Procyon lotor*	potential	irregular	riparian

TABLE 10-8 (Continued)

Species	Status	Relative Abundance	Habitat Preference
MUSTELIDAE			
Short-tailed Weasel *Mustela erminea*	potential	uncommon	ubiquitous
Long-tailed Weasel *M. frenata*	likely	common	ubiquitous
Mink *M. vison*	potential	uncommon	meadows, riparian
Marten *Martes caurina*	likely	uncommon	conifers
Wolverine *Gulo luscus*	potential	rare	conifers, aspen
Badger *Taxidea taxus*	potential	common	sagebrush, grasslands
Spotted Skunk *Spilogale putorius*	likely	common	riparian, brushlands
Striped Skunk *Mephitis mephitis*	likely	common	ubiquitous
FELIDAE			
Bobcat *Lynx rufus*	present	common	ubiquitous
FELIDAE (continued)			
Canada Lynx *L. canadensis*	potential	rare	conifers, aspen
Cougar *Felis concolor*	likely	uncommon	ubiquitous
CERVIDAE			
Mule Deer *Odocoileus hemionus*	observed	common	ubiquitous
Moose *Alces alces*	potential	uncommon	meadows, aquatic
American Elk *Cervus elaphus*	observed	common	ubiquitous

TABLE 10-9

Birds in the Huntington Canyon No. 4 Mine Study Area
Emery County, Utah (1980-1981)

Species	Status	Relative Abundance	Habitat Preference
PODICIPEDIDAE			
Pied-billed Grebe *Podilymbus podiceps*	potential, summer	uncommon	wet areas
ANATIDAE			
Mallard *Anas platyrhynchos*	potential, summer	uncommon	wet areas
Green-winged Teal *A. crecca*	potential, summer	uncommon	wet areas
Blue-winged Teal *A. discors*	potential, summer	uncommon	wet areas
CATHARTIDAE			
Turkey Vulture *Cathartes aura*	observed, summer	uncommon	ubiquitous
ACCIPITRIDAE			
Goshawk *Accipiter gentilis*	observed, resident	uncommon	conifers, aspen
Sharp-shinned Hawk *A. striatus*	observed, resident	common	wooded areas
Cooper's Hawk *A. cooperii*	potential, resident	uncommon	wooded areas

*Includes onsite observation and DWR regional information.

Table 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
ACCIPITRIDAE (Continued)			
Red-tailed Hawk *Buteo jamaicensis*	observed, resident	common	ubiquitous
Swainson's Hawk *B. swainsoni*	likely, summer	uncommon	ubiquitous
Rough-legged Hawk *B. lagopus*	likely, winter	uncommon	ubiquitous
Golden Eagle *Aquila chrysaetos*	observed, resident	uncommon	ubiquitous
Bald Eagle *Haliaeetus leucocephalus*	potential, winter	irregular	ubiquitous
Marsh Hawk *Circus cyaneus*	likely, resident	uncommon	open areas
FALCONIDAE			
Prairie Falcon *Falco mexicanus*	potential, resident	uncommon	open areas
Peregrine Falcon *F. peregrinus*	potential, migrant	irregular	open areas
Merlin *F. columbarius*	potential, winter	uncommon	open areas
American Kestrel *F. sparverius*	observed resident	uncommon	open areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TETRAONIDAE			
Blue Grouse *Dendragapus obscurus*	likely, resident	common	conifers, aspen
Ruffed Grouse *Bonasa umbellus*	potential, resident	common	aspen, brushlands
Sage Grouse *Centrocercus urophasianus*	potential, resident	uncommon	sagebrush
PHASIANIDAE			
California Quail *Lophortyx californicus*	potential, resident	common	brushlands
Chukar Partridge *Alectoris chukar*	potential, resident	common	rocky areas
Ring-necked Pheasant *Phasianus colchicus*	potential, resident	common	agricultural
ARDEIDAE			
Great Blue Heron *Ardea herodias*	potential, summer	uncommon	wet areas
Snowy Egret *Egretta thula*	potential, summer	irregular	wet areas
Black-crowned Night Heron *Nycticorax nycticorax*	potential, summer	irregular	wet areas
GRUIDAE			
Sandhill Crane *Grus canadensis*	potential, migrant	irregular	meadows

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
RALLIDAE			
Sora Rail *Porzana carolina*	potential, resident	uncommon	meadows
American Coot *Fulica americana*	potential, summer	uncommon	wet areas
SCOLOPACIDAE			
Common Snipe *Capella gallinago*	potential, resident	uncommon	meadows
Spotted Sandpiper *Actitis maculata*	potential, resident	uncommon	wet areas
PHALAROPODIDAE			
Wilson's Phalarope *Steganopus tricolor*	potential, migrant	uncommon	wet areas
Northern Phalarope *Lobipes lobatus*	potential, migrant	uncommon	wet areas
COLUMBIDAE			
Band-tailed Pigeon *Columba fasciata*	potential, summer	irregular	brushland
Mourning Dove *Zenaida macroura*	observed, migrant	irregular	ubiquitous
CUCULIDAE			
Yellow-billed Cuckoo *Coccyzus americanus*	potential, summer	irregular	riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
STRIGIDAE			
Screech Owl *Otus asio*	present, resident	uncommon	riparian
Flammulated Owl *Otus flammeolus*	potential, resident	irregular	conifers
Great Horned Owl *Bubo virginianus*	observed, resident	common	ubiquitous
Pygmy Owl *Glaucidium gnoma*	potential, resident	irregular	wooded areas
Long-eared Owl *Asio otus*	likely resident	common	wooded areas
Short-eared Owl *A. flammeus*	potential, resident	uncommon	open areas
Saw-whet Owl *Aegolius acadicus*	potential, resident	irregular	conifers
CAPRIMULGIDAE			
Poor-will *Phalaenoptilus nuttalli*	potential, resident	uncommon	wooded areas
Common Nighthawk *Chordeiles minor*	observed, summer	uncommon	ubiquitous
APODIDAE			
Black Swift *Cypseloides niger*	potential, summer	uncommon	rocky areas
White-throated Swift *Aeronautes saxatalis*	observed, summer	common	rocky areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TROCHILIDAE			
Black-chinned Hummingbird *Archilochus alexandri*	observed, summer	uncommon	brushlands
Broad-tailed Hummingbird *Selasphorus platycercus*	observed, summer	common	ubiquitous
Rufous Hummingbird *Selasphorus rufus*	likely summer	common	ubiquitous
Calliope Hummingbird *Stellula calliope*	likely, summer	common	conifers, aspen
ALCEDINIDAE			
Belted Kingfisher *Megaceryle alcyon*	potential resident	uncommon	aquatic
PICIDAE			
Common Flicker *Colaptes auratus*	observed, resident	common	wooded areas
Yellow-bellied Sapsucker *Sphyrapicus varius*	observed, resident	common	riparian, aspen
Wiliamson's Sapsucker *S. thyroideus*	observed, summer	uncommon	aspen, conifers
Hairy Woodpecker *Picoides villosus*	observed, resident	common	conifers, aspen
Downy Woodpecker *P. pubescens*	obseved, resident	common	riparian, aspen
Northern Three-toed Woodpecker *P. tridactylus*	likely, resident	uncommon	conifers

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
TYRANNIDAE			
Eastern Kingbird *Tyrannus tyrannus*	potential, summer	common	agricultural
Western Kingbird *T. verticalis*	likely, summer	common	pinyon/juniper
Cassin's Kingbird *T. vociferans*	potential, summer	uncommon	pinyon/juniper
Ash-throated Flycatcher *Myiarchus cinerascens*	observed, summer	uncommon	pinyon/juniper, riparian
Willow Flycatcher *Empidonax traillii*	observed, summer	uncommon	riparian
Hammond's Flycatcher *E. hammondii*	observed, summer	common	conifers
Dusky Flycatcher *E. obserholseri*	observed, summer	common	aspen, brushlands
Gray Flycatcher *E. wrightii*	potential, summer	irregular	dry wooded areas
Western Flycatcher *E. difficilis*	observed, summer	common	moist wooded areas
Olive-sided Flycatcher *Nuttallornis borealis*	observed, summer	uncommon	conifers
Western Wood Pewee *Contopus sordidulus*	observed, summer	common	aspen
Say's Phoebe *Sayornis saya*	likely, resident	uncommon	open areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
ALAUDIDAE			
Horned Lark *Eremophila alpestris*	potential, resident	uncommon	open areas
HIRUNDINIDAE			
Violet-green Swallow *Tachycineta thalassina*	observed, summer	common	wooded areas
Tree Swallow *Iridoprocne bicolor*	observed, summer	common	wooded areas
Rough-winged Swallow *Stelgidopteryx ruficollis*	potential, summer	common	wet areas
Barn Swallow *Hirundo rustica*	potential, summer	common	ubiquitous
Cliff Swallow *Petrochelidon pyrrhonota*	observed, summer	common	rocky areas
Purple Martin *Progne subis*	potential, summer	uncommon	open forests
CORVIDAE			
Steller's Jay *Cyanocitta stelleri*	observed, resident	common	conifers, aspen
Gray Jay *Perisorius canadensis*	potential, resident	irregular	conifers
Scrub Jay *Aphelocoma coerulescens*	potential, resident	common	pinyon/juniper

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
CORVIDAE (continued)			
Black-billed Magpie *Pica pica*	observed, resident	uncommon	ubiquitous
Common Raven *Corvus corax*	observed, resident	common	ubiquitous
Common Crow *C. brachyrhynchos*	likely	irregular	ubiquitous
Pinyon Jay *Gymnorhinus cyanocephalus*	observed, resident	common	pinyon/juniper
Clark's Nutcracker *Nucifraga columbiana*	observed, resident	common	conifers
PARIDAE			
Black-capped Chickadee *Parus atricapillus*	observed, resident	common	wooded areas
Mountain Chickadee *P. gambeli*	observed, resident	common	conifers, aspen
Plain Titmouse *P. inornatus*	observed, resident	uncommon	pinyon/juniper
Bushtit *Psaltriparus minimus*	likely, resident	common	pinyon/juniper
SITTIDAE			
White-breasted Nuthatch *Sitta carolinensis*	observed, resident	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
SITTIDAE (continued)			
Red-breasted Nuthatch *S. canadensis*	observed, resident	uncommon	conifers
Pygmy Nuthatch *S. pygmaea*	observed, resident	uncommon	conifers
CERTHIIDAE			
Brown Creeper *Certhia familiaris*	observed, resident	common	wooded areas
CINCLIDAE			
Dipper *Cinclus mexicanus*	potential, resident	uncommon	riparian
TROGLODYTIDAE			
House Wren *Troglodytes aedon*	observed, summer	common	aspen, conifers
Rock Wren *Salpinctes obsoletus*	observed, resident	abundant	rocky areas
Canyon Wren *Catherpes mexicanus*	observed, resident	uncommon	rocky areas
Bewick's Wren *Thryomanes bewickii*	potential, resident	common	pinyon/juniper
Marsh Wren *Cistothorus palustris*	potential, migrant	irregular	wet meadows

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
MIMIDAE			
Mockingbird *Mimus polyglottos*	potential, migrant	irregular	brushlands
Gray Catbird *Dumetella carolinensis*	observed, summer	uncommon	riparian
Sage Thrasher *Oreoscoptes montanus*	potential, resident	common	sagebrush
TURDIDAE			
American Robin *Turdus migratorius*	observed, resident	common	ubiquitous
Hermit Thrush *Catharus gattatus*	observed, summer	common	conifers
Swainson's Thrush *C. ustulatus*	observed, summer	uncommon	riparian, aspen
Veery *C. fuscenscens*	likely, summer	uncommon	riparian
Mountain Bluebird *Sialia currucoides*	observed, resident	uncommon	open woodlands
Western Bluebird *S. mexicana*	potential, resident	uncommon	open woodlands
Townsend's Solitaire *Myadestes townsendi*	observed, resident	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
SYLVIIDAE			
Blue-gray Gnatcatcher *Polioptila caerulea*	observed, summer	uncommon	pinyon/juniper
Golden-crowned Kinglet *Regulus satrapa*	likely, resident	uncommon	conifers
Ruby-crowned Kinglet *R. calendula*	observed, resident	common	wooded areas
BOMBYCILLIDAE			
Bohemian Waxwing *Bombycilla garrulus*	likely, winter	uncommon	ubiquitous
Cedar Waxwing *B. cedrorum*	likely, winter	uncommon	ubiquitous
LANIIDAE			
Northern Shrike *Lanius excubitor*	likely, winter	uncommon	open areas
Loggerhead Shrike *L. ludovicianus*	likely, resident	common	open areas
STURNIDAE			
Starling *Sturnus vulgaris*	potential, resident	common	agricultural
VIREONIDAE			
Solitary Vireo *Vireo solitarius*	observed, summer	uncommon	open conifers
Warbling Vireo *V. gilvus*	observed, summer	common	aspen, riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
PARULIDAE			
Orange-crowned Warbler *Vermivora celata*	observed, summer	uncommon	wooded areas
Nashville Warbler *V. ruficapilla*	likely, migrant	uncommon	riparian, brushlands
Virginia's Warbler *V. virginiae*	likely, summer	common	riparian, brushlands
Yellow Warbler *Dendroica petechia*	observed, summer	common	riparian
Yellow-rumped Warbler *D. coronata*	observed, summer	common	conifers, riparian
Black-throated Gray Warbler *D. nigrescens*	observed, summer	uncommon	pinyon/juniper
Townsend's Warbler *D. townsendi*	likely, migrant	uncommon	conifers
MacGillivray's Warbler *Oporornis tolmiei*	observed, summer	uncommon	riparian, brushlands
Common Yellowthroat *Geothylpis trichas*	likely, summer	uncommon	wet areas
Yellow-breasted Chat *Icteria virens*	likely, summer	common	riparian, brushlands
Wilson's Warbler *Wilsonia pusilla*	observed, summer	common	riparian
American Redstart *Setaphaga ruticilla*	likely, migrant	uncommon	riparian

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
PLOCEIDAE			
House Sparrow *Passer domesticus*	potential, resident	common	agricultural
ICTERIDAE			
Western Meadowlark *Sturnella neglecta*	potential, resident	uncommon	open areas
Yellow-headed Blackbird *Xanthocephalus xanthocephalus*	potential, migrant	uncommon	wet areas
Red-winged Blackbird *Agelaius phoeniceus*	potential, resident	uncommon	wet areas
Brewer's Blackbird *Euphagus cyanocephalus*	potential, resident	uncommon	agricultural
Common Grackle *Quiscalus quiscula*	potential, migrant	irregular	agricultural
Brown-headed Cowbird *Molothrus ater*	likely, resident	uncommon	wooded areas
Northern Oriole *Icterus galbula*	likely, summer	common	riparian
THRAUPIDAE			
Western Tanager *Piranga ludoviciana*	observed, summer	common	wooded areas

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE			
Black-headed Grosbeak *Pheucticus melanocephalus*	observed, summer	common	riparian, brushlands
Evening Grosbeak *Hesperiphona vespertina*	likely, resident	uncommon	wooded areas
Lazuli Bunting *Passerina amoena*	likely summer	uncommon	riparian
Indigo Bunting *P. cyanea*	potential summer	irregular	riparian
House Finch *Carpodacus mexicanus*	likely, resident	uncommon	ubiquitous
Cassin's Finch *C. cassinii*	observed, resident	uncommon	conifers
Pine Grosbeak *Pinicola enucleator*	likely, resident	uncommon	conifers
Rosy Finch *Leucosticte arctoa*	likely, winter	irregular	ubiquitous
American Goldfinch *Carduelis tristis*	likely, resident	common	riparian, agricultural
Lesser Goldfinch *C. psaltria*	likely, resident	common	riparian, brushlands
Pine Siskin *C. pinus*	observed resident	common	conifers, riparian
Red Crossbill *Loxia curvirostra*	observed, resident	common	conifers

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE (continued)			
Rufous-sided Towhee *Pipilo erythrophthalmus*	observed, resident	uncommon	riparian
Green-tailed Towhee *P. chlorura*	observed, summer	common	brushlands
Dark-eyed Junco *Junco hyemalis*	observed, resident	common	ubiquitous
Gray-headed Junco *J. caniceps*	observed, summer	common	conifers, aspen
Savannah Sparrow *Passerculus sandwichensis*	potential, summer	uncommon	wet meadows
Vesper Sparrow *Pooecetes gramineus*	potential, summer	uncommon	open areas
Lark Sparrow *Chondestes grammacus*	potential summer	uncommon	brushlands
Black-throated Sparrow *Amphispiza bilineata*	potential, summer	uncommon	brushlands
Sage Sparrow *A. belli*	potential summer	uncommon	sagebrush
Tree Sparrow *Spizella aborea*	likely, winter	uncommon	brushlands
Chipping Sparrow *S. passerina*	observed, summer	common	conifers
Brewer's Sparrow *S. breweri*	potential summer	irregular	sagebrush

TABLE 10-9 (Continued)

Species	Status	Relative Abundance	Habitat Preference
FRINGILLIDAE (continued)			
Harris' Sparrow *Zonotrichia querula*	potential, winter	irregular	brushland, riparian
White-crowned Sparrow *Z. leucophrys*	observed, resident	common	conifers, riparian
Fox Sparrow *Z. iliaca*	potential, resident	irregular	riparian
Lincoln's Sparrow *Melospiza lincolnii*	likely, resident	uncommon	wet meadows
Song Sparrow *M. melodia*	observed, resident	common	riparian

TABLE 10-10

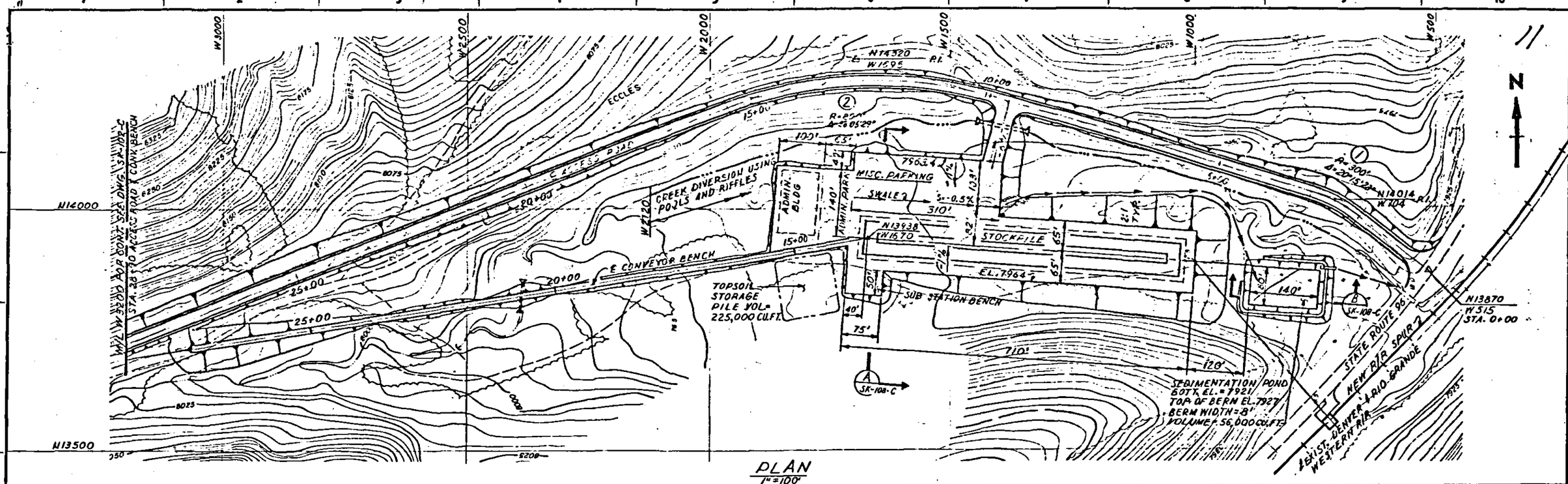
Reptiles and Amphibians in the Huntington Canyon
No. 4 Mine Study Area, Emery County, Utah (1980-81)

Species	Status*	Relative Abundance*	Habitat Preference
AMBYSTOMATIDAE			
Tiger Salamander *Ambystoma tigrinum*	likely	common	aquatic
PELOBATIDAE			
Great Basin Spadefoot Toad *Saphiopus intermontanus*	likely	common	ubiquitous
BUFONIDAE			
Western Toad *Bufo boreas*	potential	uncommon	ubiquitous
Woodhouse Toad *B. woodhousei*	likely	common	ubiquitous
HYLIDAE			
Western Chorus Frog *Pseudacris triseriata*	likely	common	aquatic, wet meadows
RANIDAE			
Leopard Frog *Rana pipiens*	likely	common	aquatic
IGUANIDAE			
Collared Lizard *Crotaphytus collaris*	likely	common	rocky areas
Leopard Lizard *C. wislizenii*	potential	common	rocky areas
Eastern Fence Lizard *Sceloporus undulatus*	likely	common	rocky areas
Sagebrush Lizard *S. graciosus*	potential	common	brushland
Tree Lizard *Urosaurus ornatus*	likely	common	brushland

*Includes onsite observation and DWR regional information.

TABLE 10-10 (Continued)

Species	Status	Relative Abundance	Habitat Preference
IGUANIDAE (Continued)			
Side-blotched Lizard *Uta stansburiana*	potential	common	open areas
Short-horned Lizard *Phryonosoma douglassi*	potential	common	open areas
TEIDAE			
Western Whiptail *Chemidophorus tigris*	likely	common	open areas
BOIDAE			
Rubber Boa *Charina bottae*	likely	common	ubiquitous
COLUBRIDAE			
Striped Whipsnake *Masticophis taeniatus*	likely	common	ubiquitous
Racer *Coluber constrictor*	likely	common	open areas
Ring-necked Snake *Diadophis punctatus*	potential	irregular	moist areas
Bullsnake *Pituophis melanoleucus*	likely	common	ubiquitous
Milk Snake *Lampropeltis triangulatum*	potential	irregular	ubiquitous
Sonora Mountain Kingsnake *L. pyromelana*	potential	irregular	wooded areas
Wandering Garter Snake *Thamnophis elegans*	likely	common	ubiquitous
Common Garter Snake *T. sirtalis*	potential	irregular	moist areas
Night Snake *Hypsiglena torquata*	potential	common	brushlands
CROTALIDAE			
Western Rattlesnake *Crotalus viridis*	likely	common	rocky or open areas



NO.	DATE	REVISION	BY	CHK	APP.
A	2-79	CONCEPTUAL DESIGN			

NOTES

DESCRIPTION	COST ACCOUNT
SEE COVER SHEET FOR DRAWING CHANGES TO COST ACCOUNT CODES	

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: AS NOTED	DATE
DESIGNED BY J. CLERJENKA	2-13-79
DRAWN BY J. MICHEAL	3-18-79
CHECKED BY	2-13-79
APPROVED BY	
APPROVED BY	

PROFESSIONAL SEAL

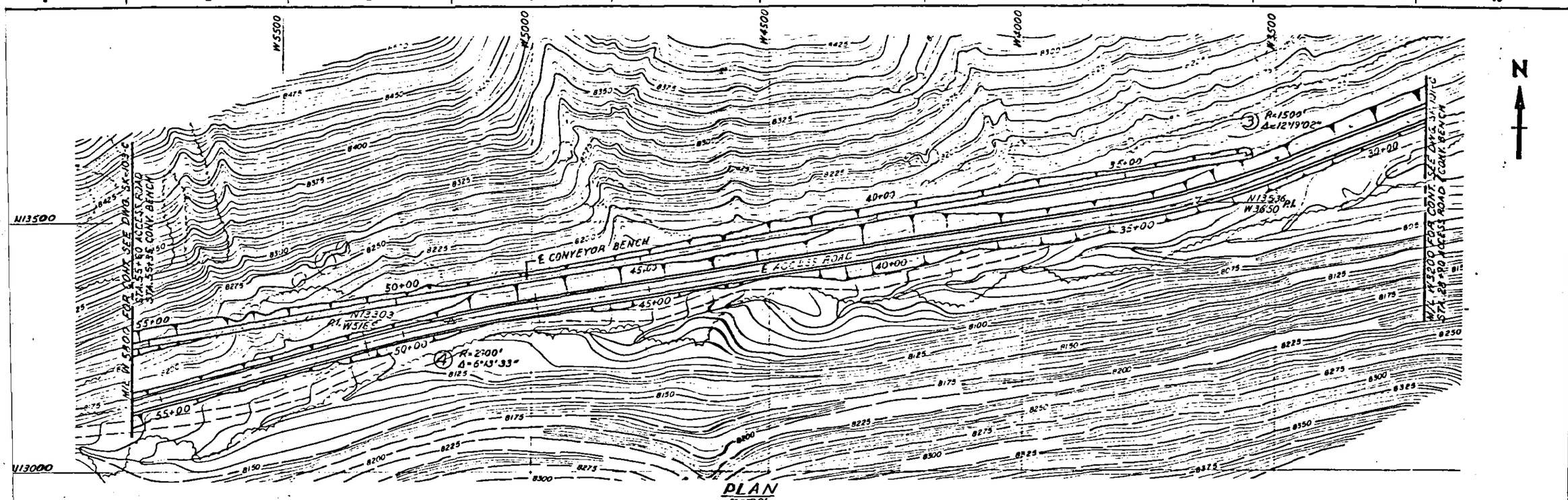
KAISER ENGINEERS

COASTAL STATES ENERGY COMPANY

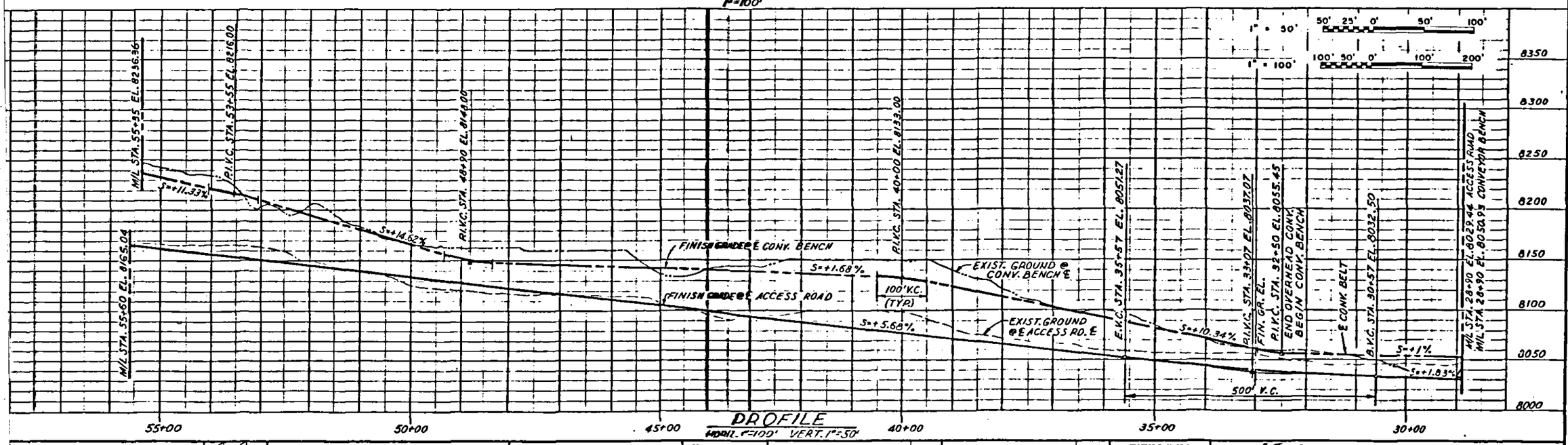
SKYLINE MINE COAL PROJECT

ACCESS ROAD & CONVEYOR PLAN & PROFILE

JOB No. 78097 | DWG. No. SK-101-C | REVISION R-A



PLAN
1"=100'



PROFILE
HORIZ. 1"=100' VERT. 1"=50'

1" = 50' 50' 25' 0' 50' 100'
1" = 100' 100' 50' 0' 100' 200'

CONCEPTUAL DESIGN						APPROVAL	DATE	SCALE: AS NOTED	DATE
REVISION	BY	CHK.	APP.	APP.	NOTES			DESIGNED BY S. CERVENKA	5-17-79
								DRAWN BY J. MICHEAL	5-21-79
								CHECKED BY [illegible]	6-13-79
								APPROVED BY	
								APPROVED BY	

DESCRIPTION — COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

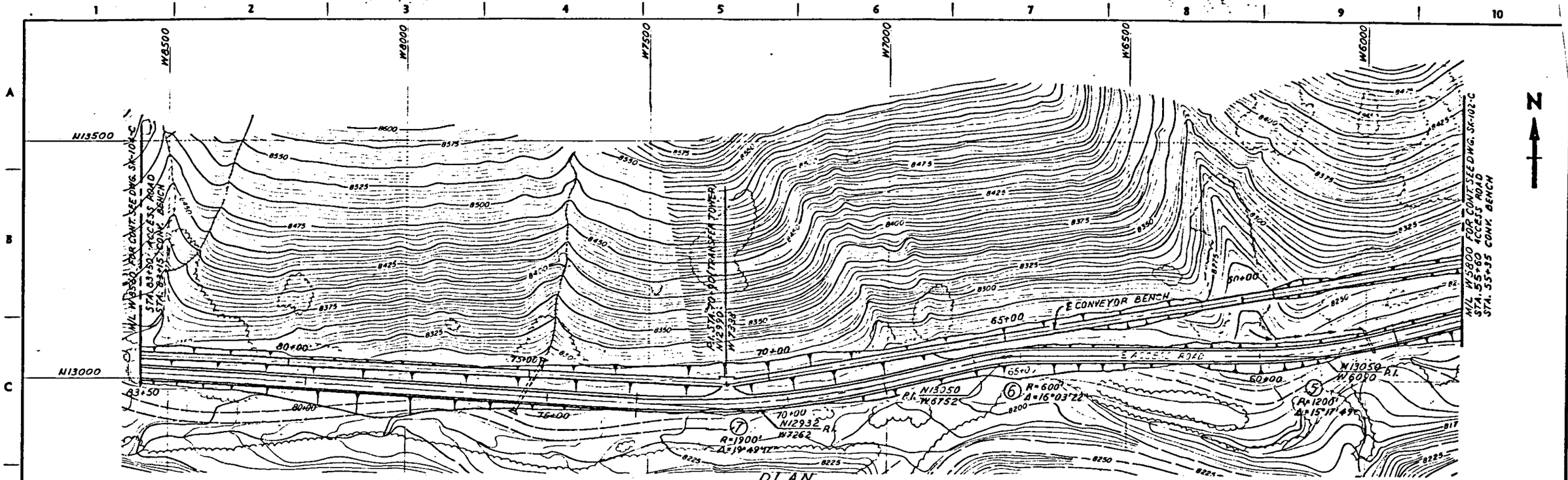
PROFESSIONAL SEAL

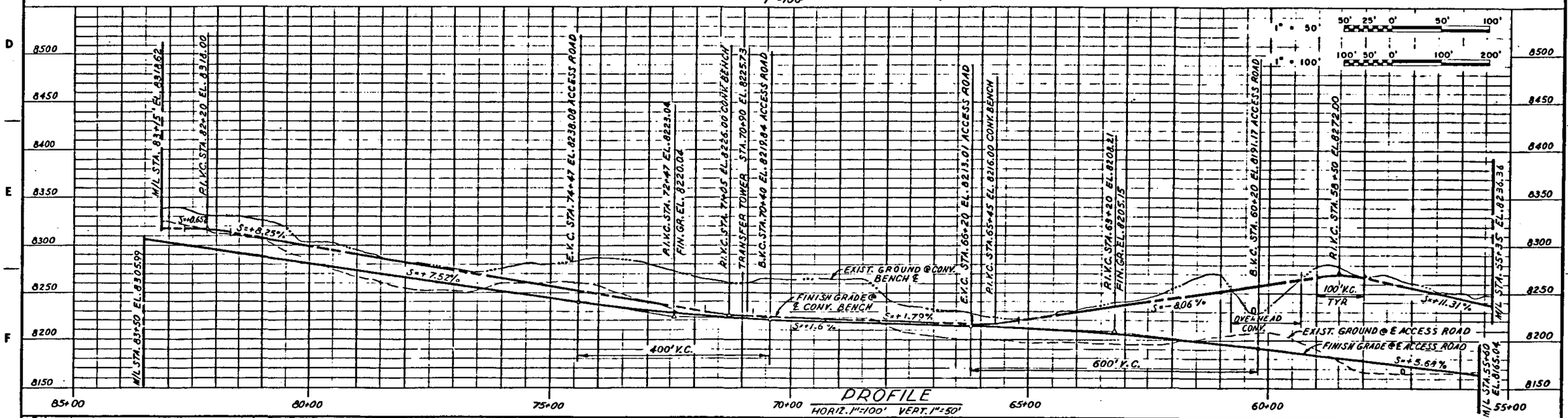
KAISER ENGINEERS
KAISER ENGINEERS, INC.
300 LAKESIDE DRIVE
P.O. BOX 23210
OAKLAND, CALIFORNIA 94623

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
ACCESS ROAD & CONVEYOR PLAN & PROFILE

JOB No. 78097 | DWG. No. SK-102-C | REVISION R-A





NO.	DATE	REVISION	BY	APP.	APP.
A	6-28-79	CONCEPTUAL DESIGN	JM		

NOTES

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: AS NOTED	DATE
DESIGNED BY S. CERVENKA	5-18-79
DRAWN BY J. MICHEAL	5-22-79
CHECKED BY M P. Hill, Jr.	6-14-79
APPROVED BY	
APPROVED BY	

PROFESSIONAL SEAL

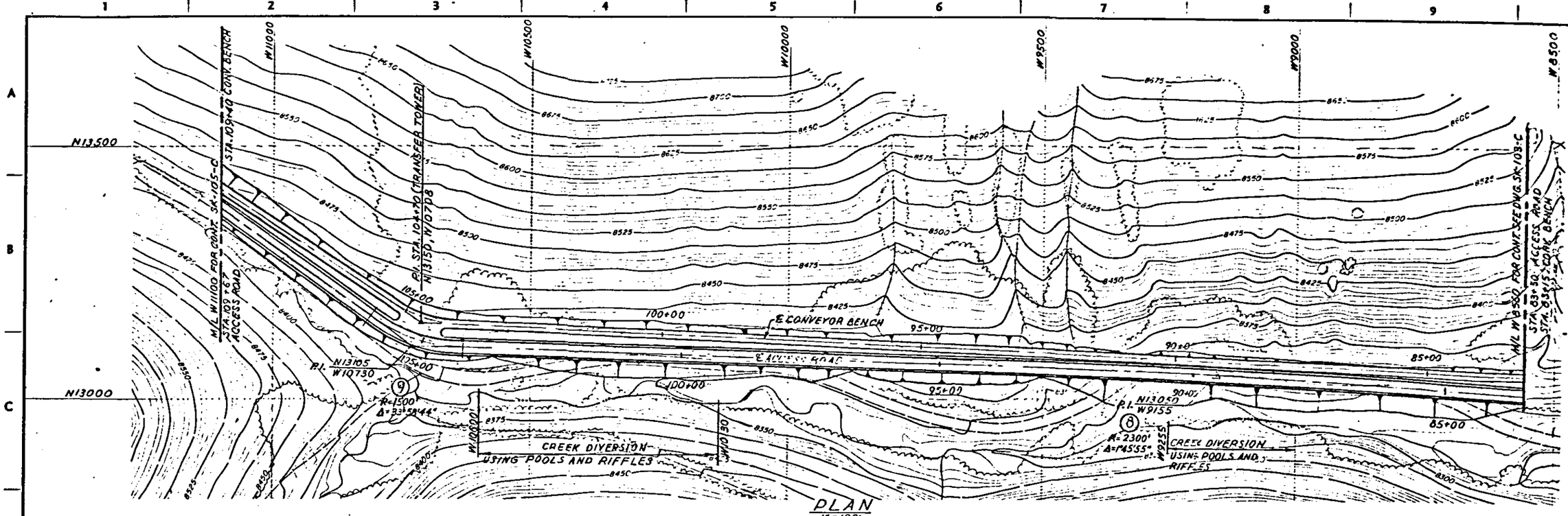
KAISER ENGINEERS

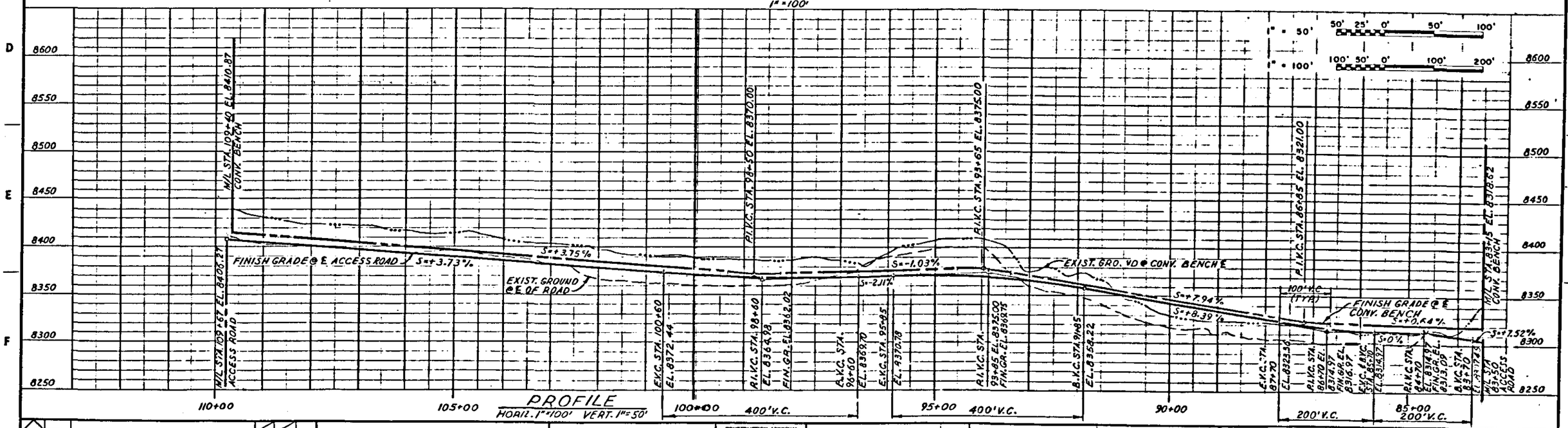
KAISER ENGINEERS, INC.
300 LAKESIDE DRIVE
P.O. BOX 23910
OAKLAND, CALIFORNIA 94623

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
ACCESS ROAD & CONVEYOR PLAN & PROFILE

JOB No. 78097 | DWG. No. SK-103-C | REVISION R-A





NO.	DATE	REVISION	BY CHK	APP.	APP.
A	6-25-79	CONCEPTUAL DESIGN			

NOTES

DESCRIPTION	COST ACCOUNT#
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: AS NOTED	DATE
DESIGNED BY S. CERVENKA	5-18-79
DRAWN BY J. MICHEAL	5-23-79
CHECKED BY W. P. Hoke	6-13-79
APPROVED BY	
APPROVED BY	

PROFESSIONAL SEAL

KAISER ENGINEERS

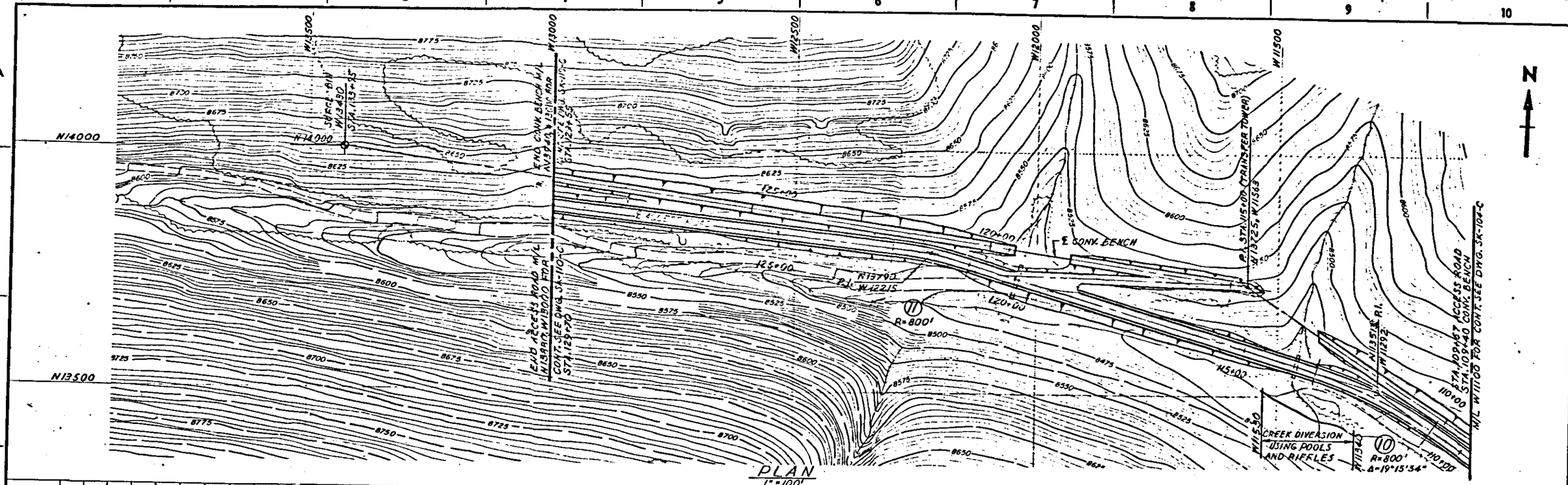
KAISER ENGINEERS, INC. 300 LAKESIDE DRIVE P.O. BOX 23210 OAKLAND, CALIFORNIA 94623

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT

ACCESS ROAD & CONVEYOR PLAN & PROFILE

JOB No. 78097 | DWG. No. SK-104-C | REVISION R-A



NO.	DATE	REVISION	BY CHK	APP.	APP.
A	12-79	CONCEPTUAL DESIGN			

NOTES

DESCRIPTION — COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

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SCALE: AS NOTED	DATE
DESIGNED BY J. CERVENKA	5-21-79
DRAWN BY J. MICHEAL	5-24-79
CHECKED BY	6-22-79
APPROVED BY	
APPROVED BY	

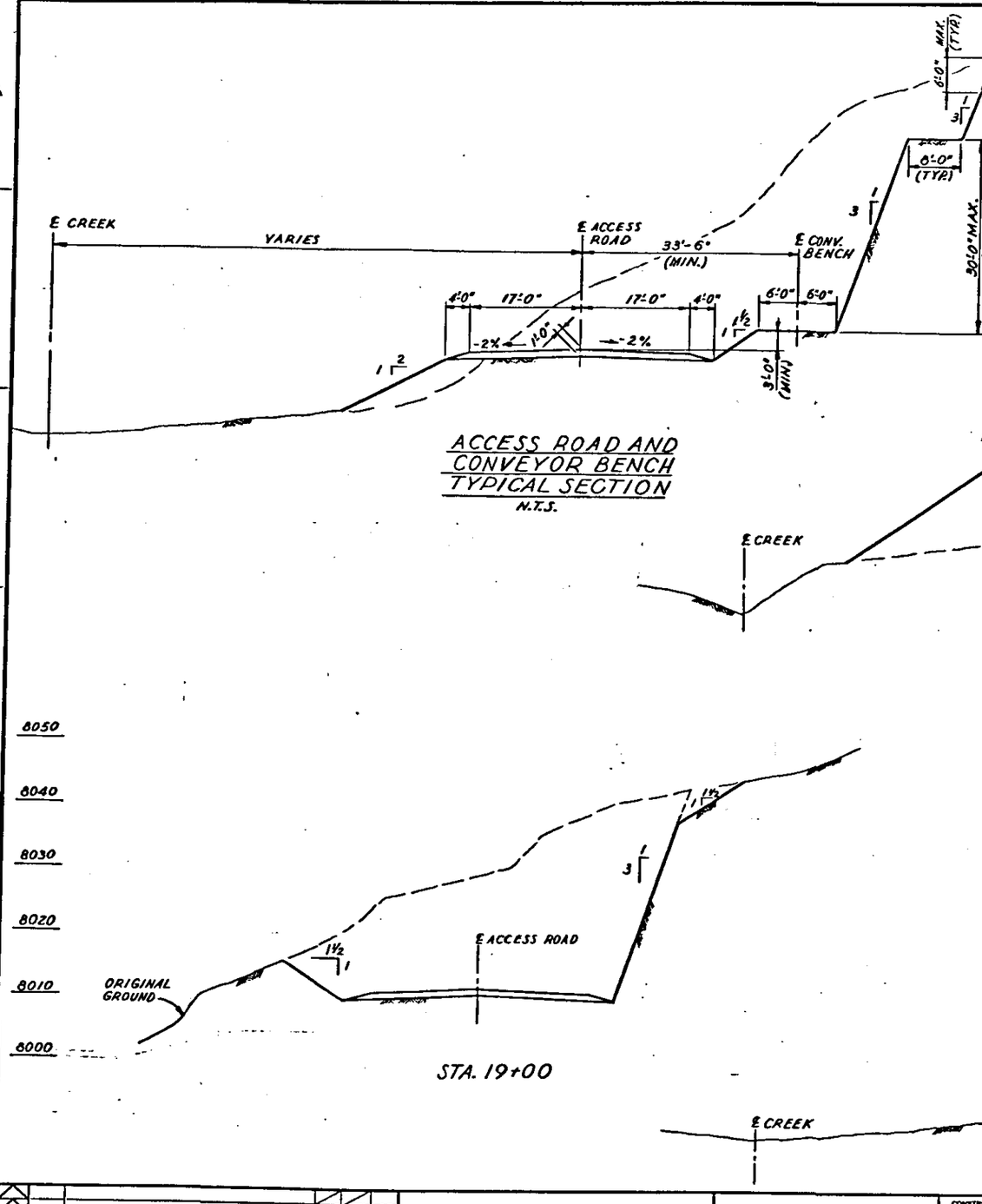
PROFESSIONAL SEAL

KAISER ENGINEERS

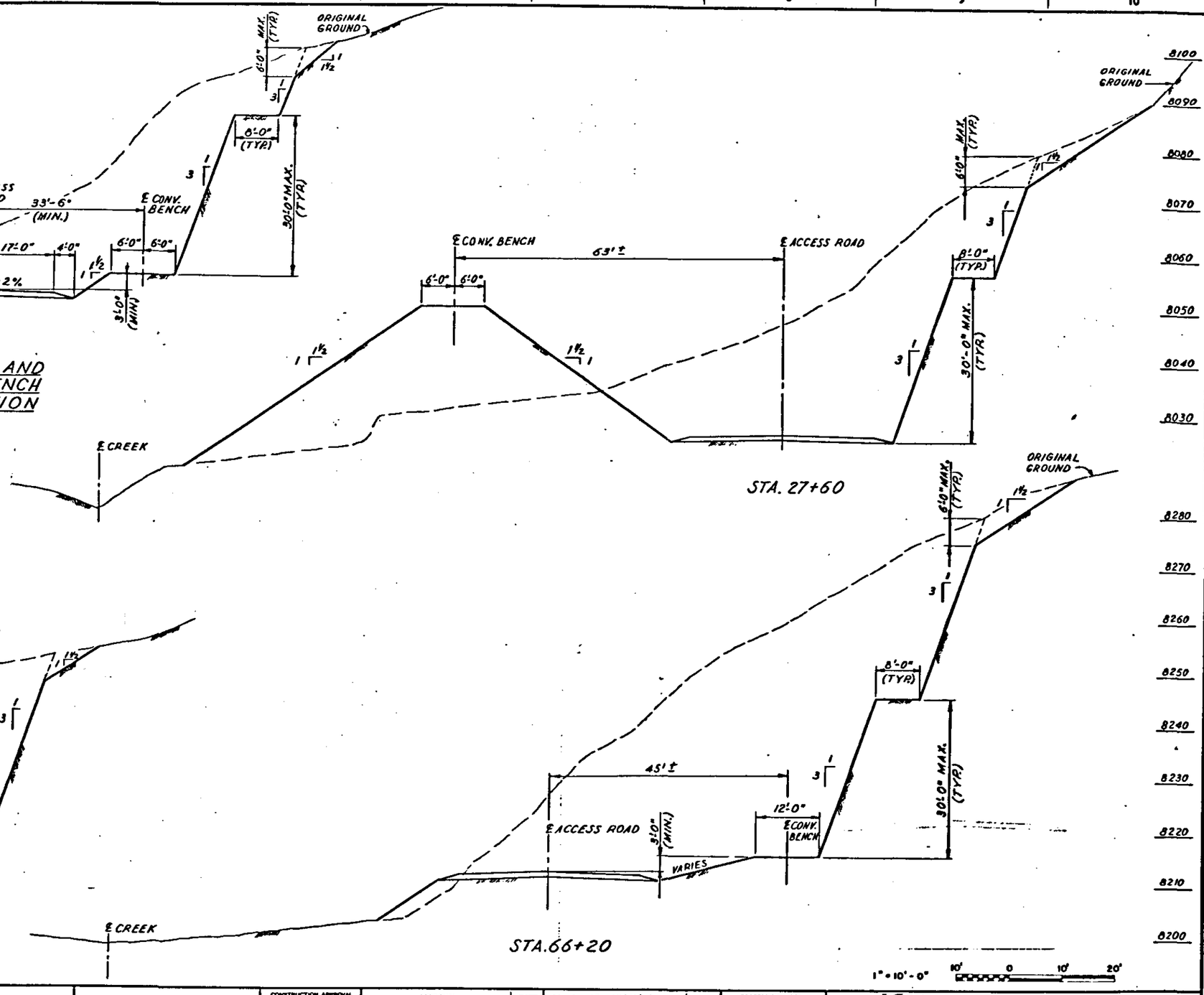
COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
ACCESS ROAD & CONVEYOR PLAN & PROFILE

JOB No. 78097 | DWG. No. SK-105-C | REVISION R. A



ACCESS ROAD AND CONVEYOR BENCH TYPICAL SECTION
N.T.S.



STA. 27+60

STA. 19+00

STA. 66+20

1" = 10'-0"

NO.	DATE	REVISION	BY	CHK	APP.	APP.
A	5-25-79	CONCEPTUAL DESIGN				

NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: 1" = 10' H&V	DATE
DESIGNED BY S. CERVENKA	6-4-79
DRAWN BY J. MICNEAL	6-6-79
CHECKED BY [signature]	6-13-79
APPROVED BY	
APPROVED BY	

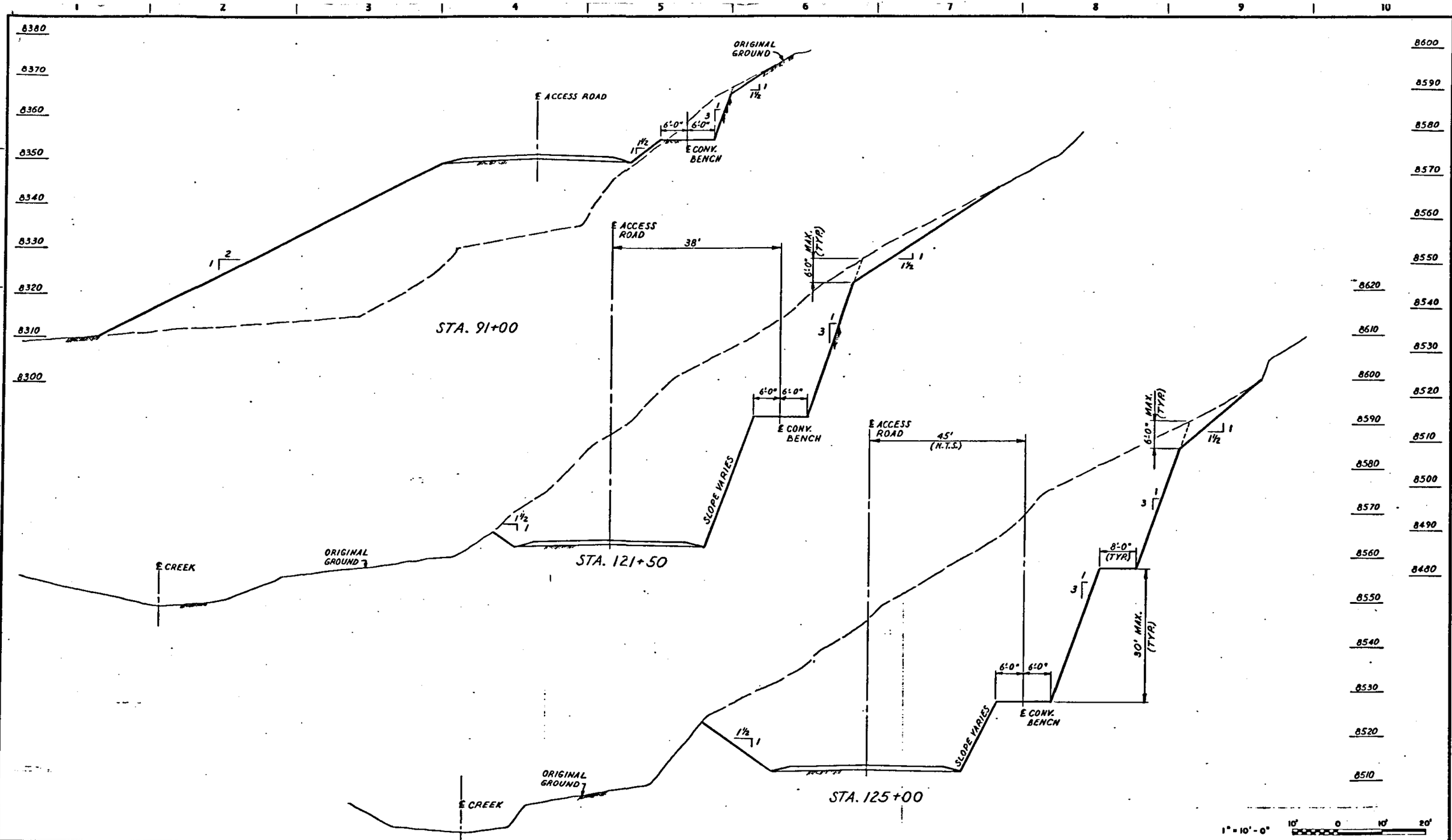
PROFESSIONAL SEAL

KAISER ENGINEERS

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
ACCESS ROAD & CONVEYOR SECTIONS

JOB No. 78097 | DWG. No. SK-106-C | REVISION R-A



NO.	DATE	REVISION	BY	APP.	APP.
1	6.25.79	CONCEPTUAL DESIGN	JM		

NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE	SCALE: 1" = 10' H & V	DATE
		DESIGNED BY S. CERVENKA	6-4-79
		DRAWN BY J. MICHEAL	6-8-79
		CHECKED BY	6-25-79
		APPROVED BY	
		APPROVED BY	

INFORMATION CONFIDENTIAL, ALL PLANS, DRAWINGS, SPECIFICATIONS AND/OR INFORMATION FURNISHED HEREWITH ARE AND SHALL REMAIN THE PROPERTY OF KAISER ENGINEERS AND SHALL BE HELD CONFIDENTIAL AND SHALL NOT BE USED FOR ANY PURPOSE OR PURPOSES OTHER THAN THOSE FOR WHICH THEY HAVE BEEN SUPPLIED AND PREPARED

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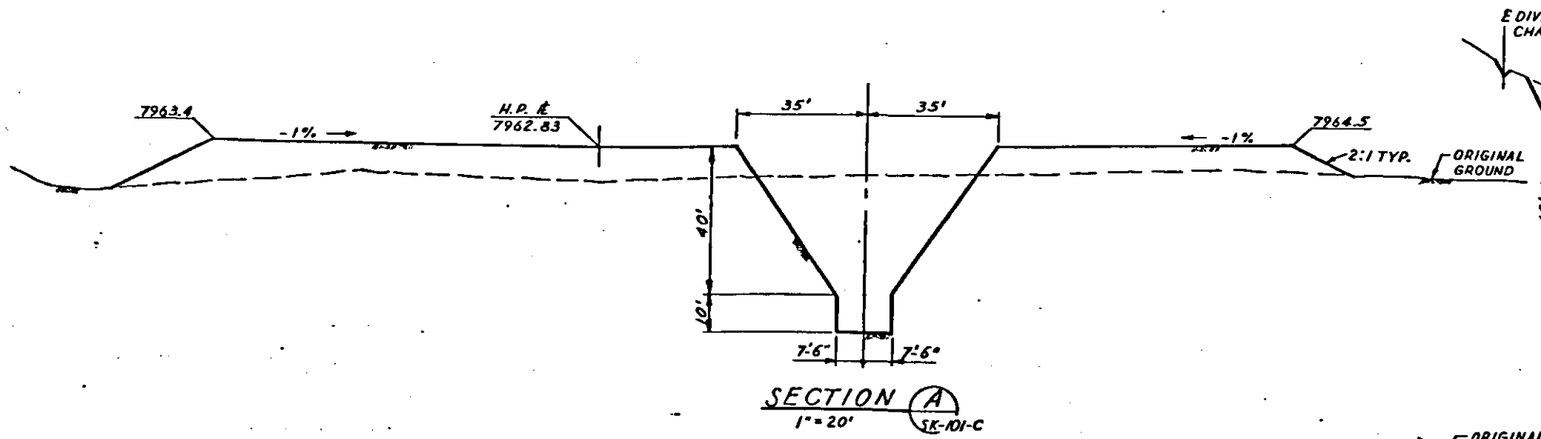
KAISER ENGINEERS

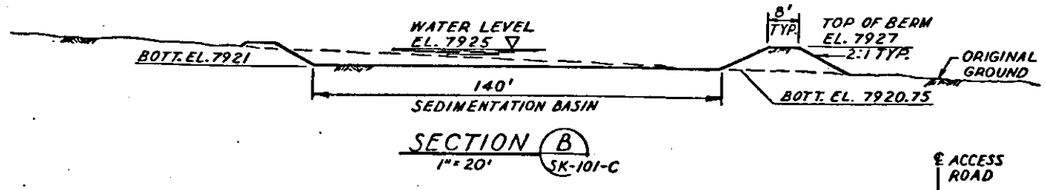
COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
ACCESS ROAD & CONVEYOR SECTIONS

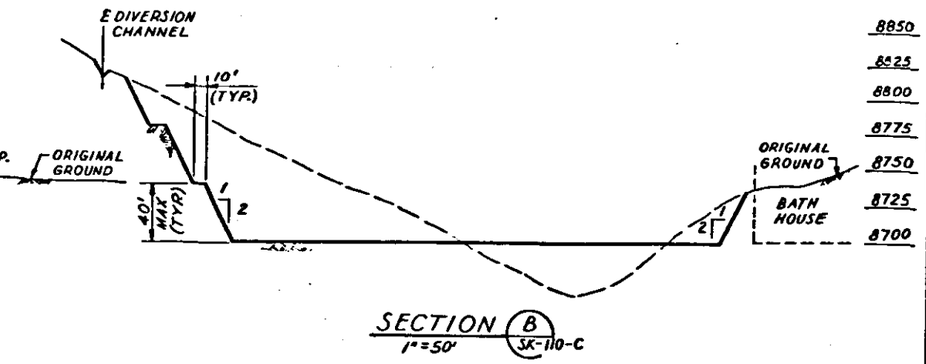
JOB No. 78097 | DWG. No. SK-107-C | REVISION R-A



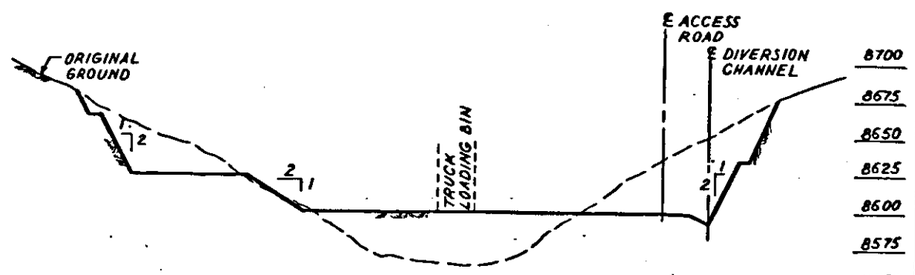
SECTION A
1"=20'
SK-101-C



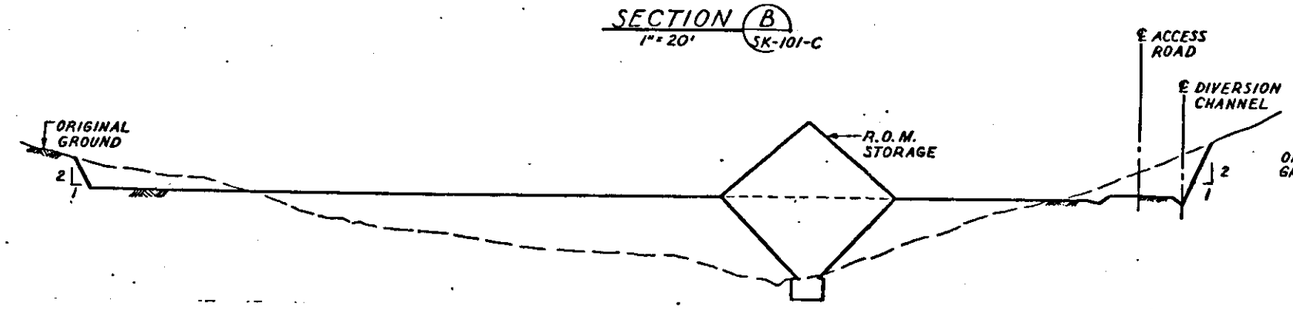
SECTION B
1"=20'
SK-101-C



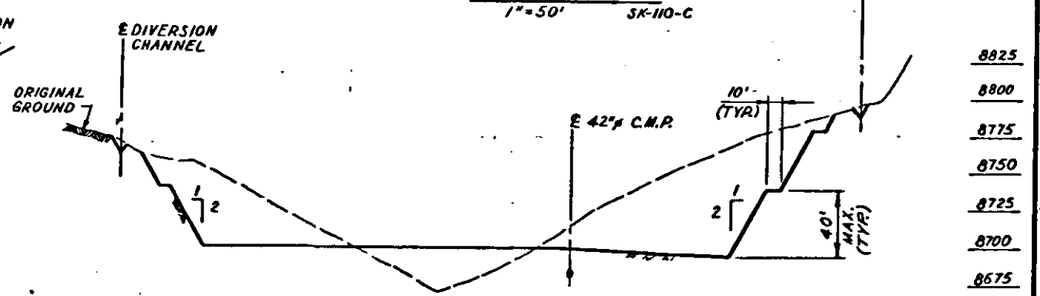
SECTION B
1"=50'
SK-110-C



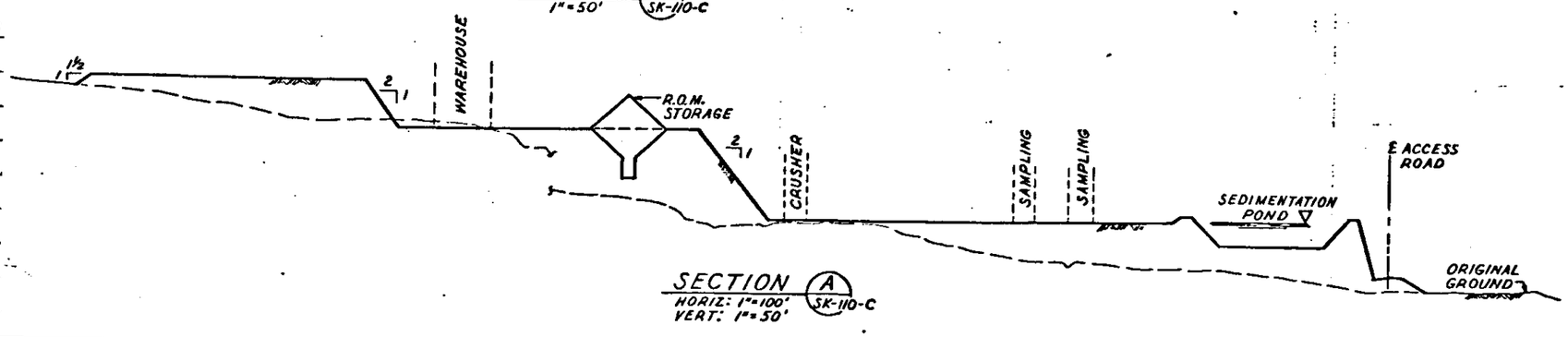
SECTION D
1"=50'
SK-110-C



SECTION C
1"=50'
SK-110-C



SECTION E
1"=50'
SK-110-C



SECTION A
HORIZ: 1"=100'
VERT: 1"=50'
SK-110-C

1" = 20' 20' 0' 20' 40'

1" = 50' 50' 25' 0' 50' 100'

1" = 100' 100' 50' 0' 100' 200'

NO.	DATE	REVISION	BY CHK	APP.	APP.
A	6-25-79	CONCEPTUAL DESIGN			

NOTES

DESCRIPTION	COST ACCOUNT
WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE	

CONSTRUCTION APPROVAL

APPROVAL	DATE

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	SCALE: AS NOTED	DATE
DESIGNED BY	J. MICHEAL	6.11.79
DRAWN BY	J.C.M.	6.12.79
CHECKED BY	M Phillips	6.25.79
APPROVED BY		
APPROVED BY		

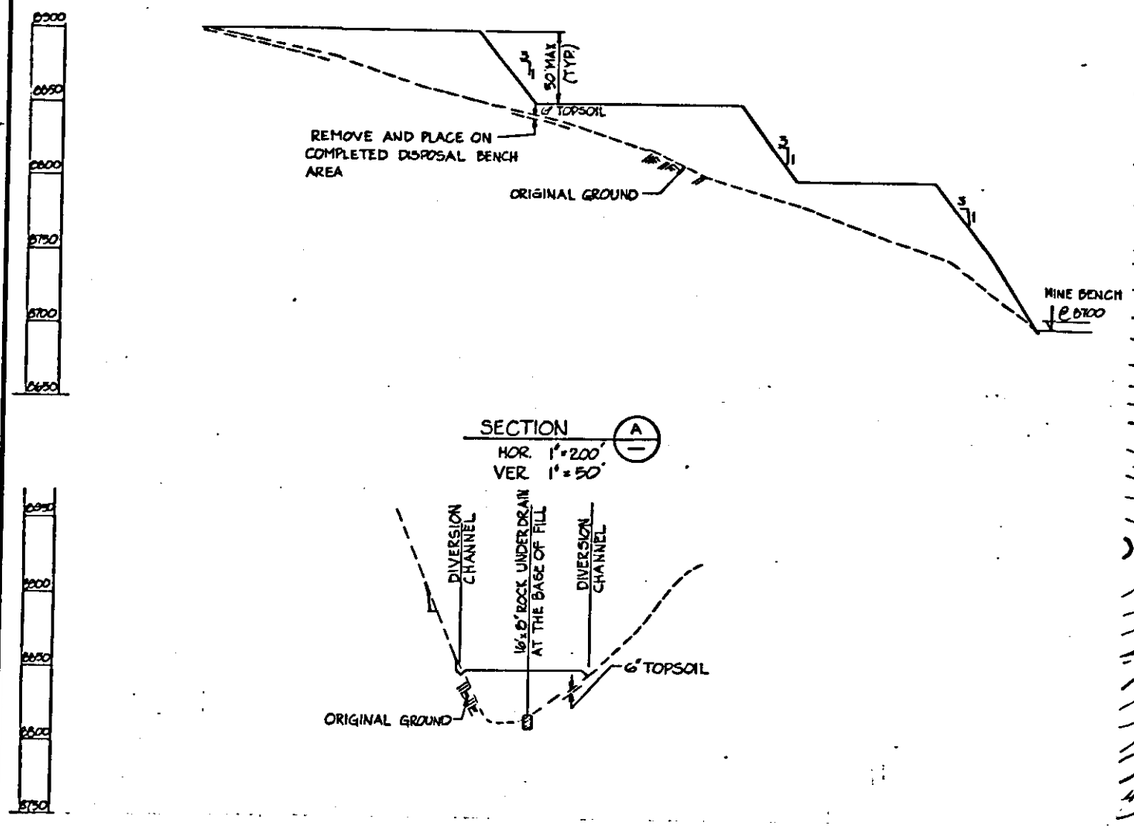
PROFESSIONAL SEAL

KAISER ENGINEERS

COASTAL STATES ENERGY COMPANY

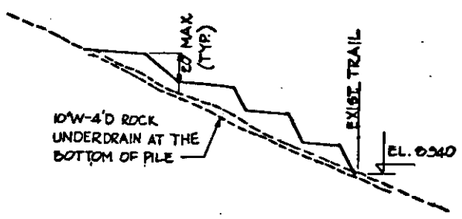
SKYLINE MINE COAL PROJECT
MISCELLANEOUS SECTIONS

JOB No. 78097 | DWG. No. SK-108-C | REVISION R-A

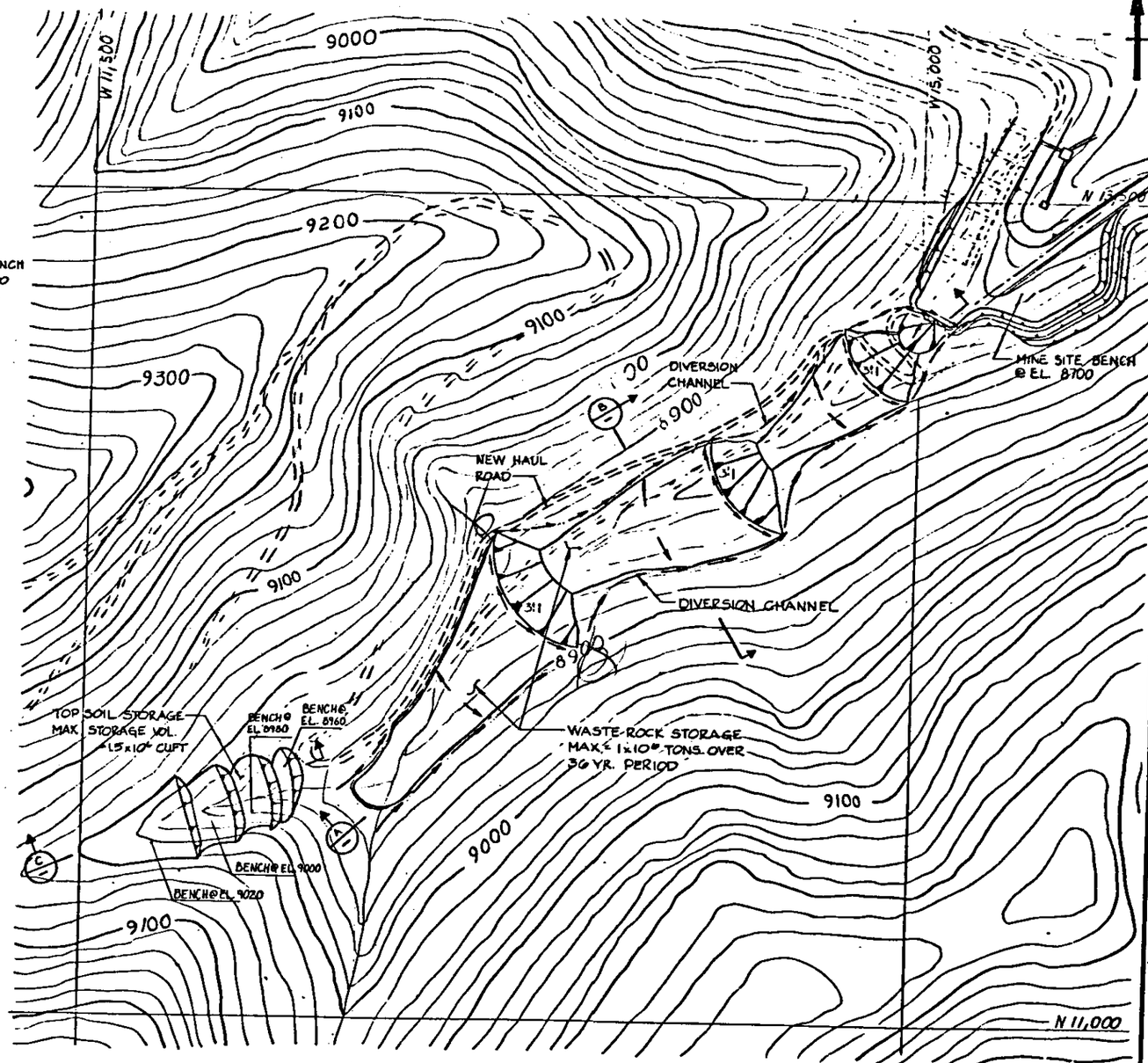


SECTION A
HOR. 1"=200'
VER. 1"=50'

SECTION B
HOR. 1"=200'
VER. 1"=50'



SECTION C
HOR. 1"=200'
VER. 1"=50'



PLAN
SCALE: 1"=200'

200 100 0 200 400

NO.	DATE	REVISION	BY	CHK	APP.	APP.
A	6-25-79	CONCEPTUAL DESIGN	ADD			

NOTES

DESCRIPTION	COST ACCOUNT

CONSTRUCTION APPROVAL

APPROVAL	DATE

SCALE: AS SHOWN	DATE
DESIGNED BY M. PHILLIPS	6-21-79
DRAWN BY N.B. / W.O.H.	6-25-79
CHECKED BY S.M.C.	6-25-79
APPROVED BY	
APPROVED BY	

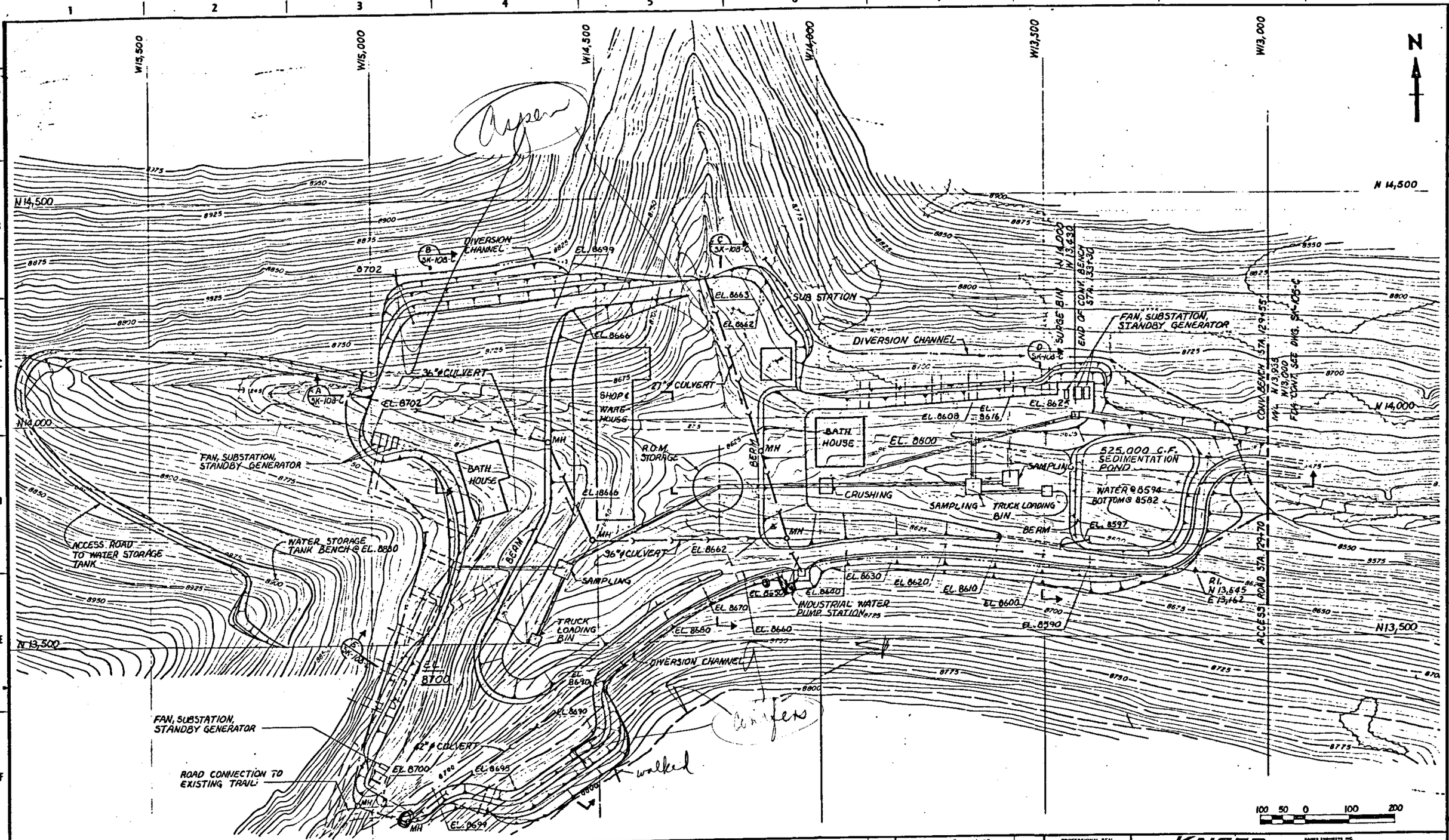
PROFESSIONAL SEAL

KAISER ENGINEERS

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
WASTE ROCK DISPOSAL PLAN & SECTIONS

JOB No. 78097 | DWG. No. SK-109-C | REVISION R-A



NO.	DATE	REVISION	BY CHK	APP.	APP.
A	6/8/79	CONCEPTUAL DESIGN			

1. BENCH ELEVATIONS ARE APPROXIMATE PENDING VERIFICATION OF COAL SEAM ELEVATIONS.

NOTES

DESCRIPTION | COST ACCOUNT

WORK COVERED BY THIS DRAWING CHARGED TO COST ACCOUNT ABOVE

CONSTRUCTION APPROVAL

APPROVAL	DATE

INFORMATION CONFIDENTIAL: ALL PLANS, DRAWINGS, SPECIFICATIONS AND/OR INFORMATION FURNISHED HEREWITH ARE AND SHALL REMAIN THE PROPERTY OF KAISER ENGINEERS, AND SHALL BE HELD CONFIDENTIAL AND SHALL NOT BE USED FOR ANY PURPOSE OR PURPOSES OTHER THAN THOSE FOR WHICH THEY HAVE BEEN SUPPLIED AND PREPARED

	DATE
SCALE: 1"= 100'-0"	
DESIGNED BY L.R. GASPARETTI	6-12-79
DRAWN BY W.O. HENDERSON	6-15-79
CHECKED BY M. Pillari	6-22-79
APPROVED BY	
APPROVED BY	

PROFESSIONAL SEAL

KAISER ENGINEERS

COASTAL STATES ENERGY COMPANY

SKYLINE MINE COAL PROJECT
PORTAL SURFACE FACILITIES PLAN

JOB No. 78097 | DWG. No. SK-110-C | REVISION R-A