# CHAPTER 10

# FISH AND WILDLIFE RESOURCES

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# CHAPTER 10

# FISH AND WILDLIFE RESOURCES

## 10.1 Scope

### 10.1.1 Objectives

The fish and wildlife studies for the Horizon Coal Corporation No. 1 and No. 2 Mines, Carbon County, Utah have been designed to satisfy the guidelines for Permit Applications for the Utah Division of Oil, Gas and Mining (UDOGM). The studies also will provide data useful to Horizon Coal Corporation in future mining activities and long-term reclamation programs.

### 10.1.2 Location and Ecological Setting

The study area is located along the eastern edge of the Wasatch Plateau in Carbon County, Utah. Elevation range is about 7,500 to 8,900 ft.

Topographically, the study area consists of steep slopes on the face of the plateau and along drainages, flat surfaces or terraces or flood plains in valley bottoms and relatively gentle terrain on top of the plateau. The area is underlain by nearly flat sedimentary rocks of the Tertio-Cretaceous North Horn Formation and the Lower Tertiary Flagstaff Formation.

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 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 difference in elevation and exposure. Major habitats include Slope Bunchgrass, Big Sagebrush, Mountain Shrub, Aspen, Pinyon-Juniper, Low Elevation Conifer, High Elevation Conifer and Subalpine Meadow associations.

## 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.

In March 1981, DWR provided detailed wildlife information for the permit area, as requested by Blue Blaze 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.

### 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 collected for the 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 correlation between plant communities and wildlife habitats is discussed in Section 10.3.1.

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 Gordon Creek study area these species were studied through a combination of systematic transects and opportunistic sightings. Road surveys were conducted during each field session to obtain data on abundance, distribution, and habitat use. This data was 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 the aerial surveys, DWR specified that this technique was not being 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, water birds and small birds or songbirds.

Raptors were observed and recorded 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 sights. Raptor surveys followed the standard survey techniques described by Call (1978). The raptor nestings were documented by the DWR (see Section 10.3.2.4).

Upland game bird surveys were conducted in conjunction with other field programs and relied primarily on chance encounters of the birds of 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.

Water birds (waterfowl, shorebirds, wading birds) were surveyed in a similar approach as other large birds i.e., during all field programs plus specific visits to suitable habitats, such as ponds and slow-moving streams. As with the upland game birds, emphasis were 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 wildlife studies, this group included perching birds, woodpeckers, hummingbirds, swifts, and frog-mouths. 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 penetration of habitats (e.g., and dense willow thicket verses an open stand of mountain brush).

The small bird transects were not permanently established routes, because the emphasis was on obtaining data from a large number of plots throughout each habitat type, rather than on repeated surveys of a small number of plots. The reasons for selecting this technique are that (1) habitats in the study area are heterogeneous and a larger sample size is necessary to adequately describe the avifauna of each, and (1) year-to-year variability within the complex habitats probably would mask any long-term trends in density, diversity, and composition.

### 10.2.2.3 Reptiles and Amphibians

These species were surveyed in combination with other field efforts. For most reptiles and amphibians, sightings provided sufficient detail on abundance and distribution. Amphibians,

however, were surveyed by visiting potential breeding sites, such as ponds or marshy areas, during the spring breeding period, when they could be identified by their vocalizations.

### 10.2.3 Aquatic Studies

Field and lab methods used in the Gordon Creek and Beaver Creek aquatic studies were selected in describing the biotic and abiotic components of study area streams, discerning possible impacts of the proposed 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 and June 1981.

#### 10.2.3.1 Sample Site Selection

Aquatic studies involved six stream sample sites: four in the Beaver Creek system and two in the North Fork Gordon Creek system. The sites were selected to provide information from representative stream reaches, above and below substantial tributaries.

The sites on North Fork Gordon Creek were located about 25 m above and 50 m below the confluence with the unnamed tributary which flows past the Horizon Mine sites. This confluence is located in extreme southwestern Section 17, at the word "North" on Figure 10-1.

The two sites in Beaver Creek were located upstream of the unnamed stream which is tributary in extreme northwestern Section 18, at the Word "Beaver" on Figure 10-1. A third site was located on the unnamed tributary called Spring Creek), and the fourth site was about 1 km farther downstream, in southern Section 7.

#### 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 spring and winter surveys. Chemical characteristics at all sample sites 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 square foot area to dislodge invertebrates, which were swept by the stream current into a trailing net. Surber samples were collected from a riffle, a run, and a pool at each site. The composite 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).

Nongame fish were to be sampled with a dip-net 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 Gordon Creek area. Habitats distinguishable in the Gordon Creek area are described below.

#### 10.3.1.1 Big Sagebrush

At lower elevations, Big Sagebrush occurred as dense, essentially monotypic stands on terraces adjacent to major drainages. The availability of green sapwood throughout the winter probably makes these areas fairly attractive to large herbivores during periods when browse is unavailable or snow is too deep at higher elevations.

Atop the plateau, Big Sagebrush occurred as relatively small stands on slopes adjacent to valley bottoms, particularly on south-facing exposures. Other shrubs associated with this community type included Antelope Bitterbrush, Rubber Rabbitbrush, and Silver Sagebrush.

#### 10.3.1.2 Mountain Shrub

One of the most widespread habitats, especially on steep slopes at lower elevations, was a highly variable mixture of shrub species typical of mountainous areas in the region. In general, two basic phases could be defined.

The xeric phase was prevalent on south-facing slopes. Characteristically, these areas were dominated by open stands of Gambel's Oak with varying amounts of Alder-leaf Mountain Mahogany, Serviceberry, Snowberry, Antelope Bitterbrush, and Rubber Rabbitbrush. Conspicuous herbaceous species during early fall were a Tansy-aster and Salina Wildrye. At higher elevations, some southfacing slopes were strongly dominated by Greenleaf Manzanita an evergreen shrub of particular values to wildlife.

The mesic phase, typically occurring on north-facing slopes, was dominated by dense stands of Gambel's Oak or Wasatch Maple. Associated woody plants included isolated clumps of Quaking Aspen, scattered Douglas Fir, and White Fir (often appearing to represent a later successional stage), and shrubs such as Chokecherry, Serviceberry, Snowberry, Woods' Rose, Oregon grape, and Mountain lower. The variable herbaceous stratum was dominated by Mountain Brome, Nodding Brome, and perennial forbs such as Aster, Erigeron, Fragaria, Frasera, Galium, Geranium, Lathyrus, Thalictrum, and Vicia.

The Vegetation Map (Plate 9-1) refers to both of these habitat phases as Oakbrush.

#### 10.3.1.3 Slope Bunchgrass

This rather widespread habitat was similar in composition to Xeric Mountain Shrub habitat, except for the near absence of woody species. The dominant plant was the bunchgrass Salina Wildrye. The casual distinction between these two xeric communities is not clear, but it probably is related to soil moisture and texture.

#### 10.3.1.4 Middle Elevation Conifer

This widespread habitat type was limited to north-facing slopes and along drainages, typically appearing as isolated clumps scattered through larger areas of Aspen or Mesic Mountain Shrub. Mature White Firs and Douglas Firs were visually and numerically dominant throughout. Prominent understory species were Mountain Snowberry, Oregon Grape, Currants, Mallow Ninebark, Woods' Rose, Aster, Fragaria, and Heuchera.

#### 10.3.1.5 High Elevation Conifer

Atop the Wasatch Plateau especially at elevations of 8,500 ft. or higher, coniferous forests were dominated by Engelman Spruce, Subalpine Fir, and Douglas Fir. Understory species were similar to those described above for Middle Elevation Conifer Forests. Although comprising a significant portion of the mine study areas. High Elevation Conifer habitats did not occur in the mine area.

#### 10.3.1.6 Aspen

Dense stands of mature Quaking Aspen occurred as a mosaic in moist sites, either on north slopes among Mesic Mountain Shrubs and Middle Elevation Conifers or along forest edges adjacent to High Elevation Conifers. In both occurrences, the understory was similar to other mesic habitats; prominent species included Mountain Snowberry, Mountain-lower, Oregon Holly-grape, Fragaria, Geranium, Lathyrus, Thalictrum, and Vicia. In the north-slope phase of this community type, Wasatch Maple often was sufficiently common to be considered a co-dominant. This habitat does not occur in the disturbed mine area.

#### 10.3.1.7 Mixed Riparian

Streams at lower elevations in the study area generally were characterized by riparian vegetation dominated by larger deciduous shrubs: Mountain Maple, Redtwig Dogwood, Elderberry, Chokecherry, and Willow (Salix) species. This assemblage was most common in shaded areas, where the stream was closest to the base of north-facing slopes. More open sites often lacked a distinct riparian community, instead being dominated by species occurring on adjacent xeric hillsides. Trees frequently were absent altogether, but some sites did support large Plains Cottonwoods and Box Elders.

At higher elevations, aspen and conifers (including Blue Spruce) often occurred as part of the riparian complex. Riparian areas lie within the study area but not within the area to be disturbed by mining operations.

#### 10.2.1.8 Subalpine Moist Meadow

Moist meadows commonly were the dominant riparian habitat type above 8,500 ft. These open areas supported dense stands of mesic grasses, such as Foxtail, Red-top, Canada Wildrye, Reed Canary-grass, Bluegrass species, and Sedge species.

#### 10.3.1.9 Aquatic Ecosystems

The two major aquatic habitats within the study area are Gordon Creek and Beaver Creek.

Gordon Creek originates from two unnamed intermittent tributaries about 5 km southwest of the mine site, at an elevation of about 8,750 ft. Within the study area, Gordon Creek is augmented by a number of minor intermittent tributaries, (particularly the North Fork Gordon Creek) that flows past the mine site. Between the upper limits of permanent water at 8,750 ft. and the confluence with Gordon Creek 7,550 ft., Gordon Creek covers approximately 3.5 miles of stream length, with a mean gradient of 340 ft/mile or 6.5 percent. The stream has few meanders but is characterized by scattered beaver ponds. Riparian vegetation is poorly developed along much of its length.

Beaver Creek originates at 9,200 ft. about 4 km west of the mine site, first being mapped as a perennial stream at an elevation of 8,950 ft. 0.8 km below its upper end. Beaver Creek is fed by a perennial stream ("Spring Creek") within the study area. During the 1980-81 field studies, however, this tributary was dry above the spring (8,550 ft.) except during snow-melt. Between the upper limits of permanent water and its confluence with Sand Gulch near the northern end of the study area at 8,300 ft., Beaver Creek has a mean gradient of 650 ft/mile (12 percent). Much of the stream length is characterized by active or abandoned beaver ponds, willow thickets, and wet meadows with fairly well-developed meanders in some broader sections.

### 10.3.2 Wildlife

#### 10.3.2.1 Aquatic Wildlife Habitat Value Determination

Based on benthic macroinvertebrate and aquatic habitat surveys, and on data provided by DWR (1981a), Gordon Creek is of limited value as a fishery, because it does not support game species. Beaver Creek, however, is ranked by DWR as being of substantial value as a salmonid fishery, with a self-sustaining population of introduced Yellowstone Cutthroat Trout. Nongame fish species listed by DWR for Beaver Creek in the study area are the Mottled Sculpin, Mountain Sucker, and Speckled Dace. No fish were seen in Beaver Creek during the April or June surveys, suggesting that populations are fairly small in the study area, probably due to low flows and low gradients (the latter reflected by fairly high temperatures). Fish surveys were not conducted because the mining project is not expected to affect the stream. This was recognized by DWR in their evaluation of wildlife in the study area (DWR 1981a).

The greatest value of both Beaver Creek and Gordon Creek aquatic habitats in the area probably is the water, cover, food and breeding sites they provide to a variety of terrestrial vertebrates.

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

Information provided by DWR (1981a) indicate that the most important habitat types in the study area are the Mixed Riparian zones along Beaver Creek and Gordon Creek and the Subalpine Moist Meadows atop the plateaus. 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 food items(such as herbage, seeds, fruit, invertebrates, and small vertebrates). Moist meadows also possess many of these ecological qualities, although they lack structural diversity.

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.

DWR's designation of riparian and moist meadow habitats as "crucial", because they are limited in extent, attract species not otherwise present, and support high densities of small animals. However, all habitats are important by some criteria. Thus, for example, Xeric Mountain Shrub provides valuable winter forage for deer and elk, while Middle and High Elevation Conifers and Aspen provide thermal and hiding cover for the same species.

Certainly one of the most important habitats is in the vicinity of the Gordon Creek Study area is the mosaic or chained pinyon/juniper and pasture maintained by DWR to provide high priority and crucial-critical winter range for deer and elk. The high quality of these areas is related to the combination of shrubs for winter browse in the chained areas, palatable grasses and legumes for nutritions early spring forage in the pastures, and thermal and hiding cover in unchained areas along drainages. The value of these areas is discussed further in subsequent sections on big game an impacts.

At the request of the applicant, the methods used for studying the various groups of terrestrial vertebrates were discussed informally with Larry Dalton of DWR in Price, Utah, in September, 1980. These methods are summarized in the following sections.

### 10.3.2.2 Mammals

Sixty-six species of mammals are known to inhabit the biogeographic area in which the project and adjacent areas are located. It is probable that all of these species inhabit the project area (reference the Division Publication No. 90-11).

The red bat is a summer resident of the biogeographic area that surrounds the project site. The animal roosts in wooded areas (riparian woods and pinion-juniper forests) of the submontane ecological association. Such areas represent this animal's substantial valued use area. An occasional individual has been known to utilize caves; those individuals could hibernate and remain over winter.

The western big-eared bat is a year resident of the biogeographic area that surrounds the project site. This animal roosts and hibernates within caves, mine tunnels or suitable buildings located in the pinion-juniper, shrubland and low elevation spruce-fir habitats of the submontane and montane (Canadian life zone) ecological association. Such areas represent this bat's substantial valued use area. No bats were found to inhabit the mine tunnels of the mine area. At the request of Bill Bates of the DWR a letter was written to his attention on April 30, 1992 by William R. Skaggs. The letter stated that Mr. Skaggs had observed no bats inhabiting the mine workings when he had been inside the mine (see Appendix 10-1).

The snowshoe hare is a yearlong resident of the biogeographic area that surrounds the project site. Its relative abundance has been determined to be limited, since its substantial values use area is restricted to the spruce-fir and nearby aspen and riparian habitats of the montane (Canadian and Hudsonian life zones) ecological association. Such areas are ranked as being of high-priority value to the animal during its breeding season which spans the period between early April and Mid-August.

The cottontail rabbit (mountain cottontail inhabits sites lying between 7,000 and 9,000 feet in elevation and the desert cottontail inhabits sites lower than 7,000 feet in elevation) is a yearlong resident of the biogeographic area that surrounds the project site. The entire project area represents a substantial valued use area for cottontails. Their young are born between April and July. This is a crucial period for maintenance of the cottontail population.

The northern flying squirrel is a yearlong resident of the biogeographic area that surrounds the project site. Currently, its relative abundance is unknown. Its substantial valued use area is restricted to spruce-fir or other mixed conifer habitats of the montane (Canadian and Hudsonian life zones) ecological association. This species is the only nocturnal squirrel in Utah. The flying squirrel may build its nest within an old woodpecker hole or it may build an outside nest of leaves, twigs and bark. Mating occurs twice in each year, February through March and June through July. Two to six young are born after a gestation period of 40 days, April through May and August through September. These periods are of crucial value to maintenance of their populations. During winter flying squirrels are gregarious; 20 or more have been known to den together.

Beaver are yearlong inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area is restricted to riparian and adjacent aspen habitats (those located within 100 meters of the riparian zone) in the cold desert, submontane and montane (Canadian life zone) ecological associations. These animals construct a conical shaped lodge in which a family group lives throughout the year. The lodge is of critical value to maintenance of the beaver population. One litter of kits is produced each year; they are born between late April and early July after a gestation period of 128 days. Kits and yearlings co-inhabit the lodge with the adult pair. When they attain 2 years of age they are forced to leave; females can breed at 2.5 years of age. Due to the animal's dependency upon flowing water and the associated riparian vegetation, the riparian wildlife habitat is ranked as being of critical value to beaver populations.

The red fox is a yearlong inhabitant of the biogeographic area that surrounds the project site. The substantial valued use area for the red fox would include all wildlife habitats extending from the cold desert through the montane (Canadian life zone) ecological associations. Almost nothing is known of their population dynamics. Without doubt a crucial period for the red fox is when they are caring for young in the den. Dens while being inhabited are a critical use area.

The gray wolf is a historic inhabitant of the biogeographic area that surrounds the project site. Currently its relative abundance is so low that the animal is listed as endangered with extinction. The wolf's substantial valued use are would be represented by any remote habitat in any ecological association.

Black bears are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area is represented by all natural wildlife habitats (excluding the pasture and fields and urban or park types) extending from the submontane into the montane (Canadian and Hudsonian life zone) ecological associations. These animals go into a semi-hibernation during winter. During this crucial period, which may last from December through March, the animal secrets itself in a den in order to conserve body energy reserves. The young are born in the den during January or February. Dens while being inhabited represent a critical valued use area for bears.

Many of the members of the family mustelidae are known to inhabit the biogeographic area that surrounds the project site. They are all protected and classified as furbearers, short-tailed and long-tailed weasels, mink, wolverine, marten, badger, striped and spotted skunks. Additionally, raccoon and muskrat, although not furbearers, are also inhabitants of the biogeographic area that surround the project site. All of these species are of high interest due to their value in the fur market.

The substantial valued use area for short-tailed and long-tailed weasels, mink, muskrat and raccoons is the riparian habitat. Weasels, which are inhabitants of the project site, do make some use of other habitats that are proximal to riparian zones. Muskrats and raccoons are restricted to riparian habitats of the cold desert and submontane ecological association; thus, they are not found on the project area. The long-tailed weasel can be found from the cold desert up into the montane (Canadian and Hudsonian life zones) ecological associations. The

short-tailed weasel and mink populations extend their use from the submontane into the montane ecological association. It is important to note that the weasel is restricted to the Canadian life zone; where as the mink utilize the Canadian and Hudsonian life zones.

The substantial valued use area for marten and wolverine is the montane ecological association. The marten does not utilize the Alpine life zone but the wolverine can be found at that elevation. Both species could be found in the environs of the project site.

The substantial valued use area for badger and skunk span all wildlife habitats other than dense forests in the cold desert, submontane and montane (Canadian life zone) ecological associations. Skunks show some preference for habitats proximal to water. Skunks and badgers are dependent upon a suitable prey source.

A crucial period for maintenance of all fur bearers, raccoons and muskrat populations is when they have young in a nest, den or lodge. Such sites are critical for reproductive success.

Bobcat, Canada lynx and cougar are known to inhabit the biogeographic area that surrounds the project site. For all of these species a crucial period for maintenance of their population is when the female has her young secreted at a den site. Such sites are of critical value when being utilized. It is also crucial to their survival that a female accompanied by young not be killed or harassed.

The substantial valued use area for bobcats extends from the cold desert through the submontane and into the montane (Canadian life zone) ecological association. The bobcat is normally associated with precipitous terrain, but has been observed in every wildlife habitat within the aforementioned ecological associations. Their primary prey source is represented by small mammals and birds or any other small animal they can catch. It is important to note that bobcats occasionally do kill the young of big game animals.

The substantial valued use area for the Canada lynx is restricted to the Canadian and Hudsonian life zones of the montane ecological association. Normally, this cat would only be expected to utilize riparian and forested wildlife habitats. The lynx is similar to predation habits to the bobcat.

The substantial valued use area for the cougar (locally known as mountain lion) extends from the submontane into the montane (Canadian and Hudsonian life zones) ecological association. Due to the dependance of the cougar upon mule deer as a prey source, a ranking of the lion's seasonal distribution parallels that of the deer.

Mule deer are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending from the cold desert through the submontane and montane ecological associations. In some situations deer show altitudinal migrations in response to winter conditions. There are, however, habitats where deer reside on a yearlong basis.

Migration of mule deer from summer range to winter range is initiated during late October; probably, the annual disturbance of the fall hunting season coupled with changing weather conditions is the initial stimulus. The onset of winter weather reinforces the deer's urge to migrate and continued adverse weather keeps the deer on the winter rage.

A portion of the project site represents winter range for mule deer herd unit 32. Winter ranges for mule deer are all ranked as being of high-priority value to the animal (inhabited between November 1 and May 15). During winters with severe conditions the higher elevation portion of the winter range becomes unavailable to deer due to snow depth. Although, no critical summer or winter ranges are found on the project area, the access route passes through high-priority and critical valued use areas in Deer Herd Units 32 and 33.

Mule deer fawn during the month of June. The wildlife habitats extending from the pinion-juniper through the shrubland and into the aspen type probably represents the fawning area. All riparian areas are of critical value for fawning and maintenance of the deer population. To date no specific areas showing annual use for fawning are known. It is probable that such areas exist; they would be ranked as being of critical value to deer. It is important to note that June represents a crucial period for maintenance of deer populations.

Agriculture areas nearby (Gordon Creek Wildlife Management area) to the project area are utilized yearlong by mule deer. Their use is intensified during the winter and spring periods.

Moose are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats in the montane ecological association except those associated with the Alpine life zone. In some situations moose show altitudinal migrations in response to winter conditions. There are, however, habitats where moose reside on a yearlong basis.

Migration of moose from summer range to winter range is initiated during late November; probably, changing weather conditions is the initial stimulus. The onset of winter weather reinforces the moose's urge to migrate and continued adverse weather keeps the animal on the winter range.

A portion of the project site represents winter range for the Southeastern Utah moose herd--Price River--White River drainages. Winter ranges for moose that are characterized as riparian habitats are ranked as being of critical value, where as the remainder of the winter ranges are ranked as being of high-priority value to the animal. Winter ranges are usually inhabited by moose between December 1 and May 15 each year. During winters with severe conditions the higher elevation portion of the winter range becomes unavailable to moose due to snow depth. Critical valued sites must be protected from man's disturbance when the moose are physically present on the range.

Moose begin their migration back to summer range during mid-May and remain there throughout November. Summer ranges on the project area support animals from the Price River-White River, Scofield and Huntington drainages of the South eastern Utah moose herd. Those summer ranges are ranked as being high priority value.

Ranges that support moose on a yearlong basis are ranked as being of critical value.

Moose calf during late May and June. Calving takes place in the riparian or adjacent forest habitats. Without doubt, all riparian areas are of critical value for calving and maintenance of the moose population. To date no specific areas showing annual use for calving are known. It is probable that such areas exist; they would by ranked as being of critical value to moose. It is important to note that June represents a crucial period for maintenance of moose populations.

Rocky Mountain elk are inhabitants of the biogeographic area that surrounds the project site. Their substantial valued use area spans all wildlife habitats extending from the submontane through the montane ecological association. Elk do not show as strong of altitudinal migration as mule deer do in response to winter conditions, but they do migrate to wintering areas.

Migration of elk from summer range to winter range is initiated during late October; probably, the annual disturbance of the fall hunting seasons coupled with changing weather conditions is the initial stimulus. The onset of winter weather reinforces the elk's urge to migrate and continued adverse weather keeps elk on the winter range.

A portion of the project site represents winter range for the Manti elk herd unit 12. Winter ranges for elk are all ranked as being of critical to the animal; these areas are usually inhabited between November 1 and May 15 each year. During winters with severe conditions some portions of the winter range become unavailable to elk due to snow depth. Traditionally, some restricted portions of the winter range have shown concentrated use by the elk; these sites, some of which exist on the project area, are ranked as being of critical value. Critical valued sites must be protected from man's disturbance when the elk are physically present on the range.

Elk begin their migration back to summer range during mid-May and remain there throughout October. Summer ranges on the project area support the Manti elk herd-unit 12; they are ranked as being of critical value.

Elk calf during the month of June. Their preferred calving areas are best described as aspen forests with lush understory vegetation. All riparian areas on the summer range are of critical value for calving and maintenance of the elk population. To date no specific areas showing annual use for calving are known. It is probable that such areas exist; they would be ranked as being of critical value to elk. It is important to note that June represents a crucial period for maintenance of elk populations.

Currently, there are no other known high interest wildlife species or their habitat use on or adjacent to the project area. It is not unreasonable to suspect that in the future, some additional species of wildlife may become of high interest to the local area, Utah or the Nation. If such is the case, the required periodic updates of project permits and reclamation plans can be adjusted and appropriate recommendations made.

### 10.3.2.3 Birds

Two hundred forty-two species of birds, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is possible that one hundred thirty-eight of these species inhabit the project area.

Ducks commonly known as waterfowl are not known to utilize the project area. However for short periods and on occasion or during different seasons of the year an occasional bird, pair or flock may inhabit the mine plan area. All waterfowl are of high interest to the State of Utah. Generally speaking, the riparian and wetland habitats encompassed by the project and adjacent areas provide substantial valued habitats for waterfowl. Each species has different life requirements, but none make significant use of the riparian and wetland environs associated with the project.

If any waterfowl were to nest locally, the period March 15 through July 15 would be ranked as being of crucial value to maintenance of the population. Following incubation, which dependent upon the species may vary between 20 and 28 days and extend up until mid-August, the riparian and wetland habitats represent a high-priority brooding area. Additionally, the wetland habitat (only large open water areas or dense marshland) is of high-priority for seclusion and protection of adult waterfowl during their flightless period when they moult. Males may begin the moult in early June and both sexes and the young are capable of flight by mid-August.

All wetlands and open water areas can become locally important as high-priority use areas for waterfowl during peak migration periods in the spring (March 15 through May 15) and fall (August 15 through October 15).

The project and adjacent areas provides substantial valued habitat for a multitude of raptors - turkey vulture, bald and golden eagles, four species of falcons (prairie, American peregrine and arctic pere falcons, and American kestrel), five species of hawks (goshawk, sharp-shinned, Cooper's, red-tailed and Swainson's hawks) and seven species of owls (barn, screech, flammulated, great horned, pygmy, long-eared and saw-whet owls). Many of these species are of high federal interest. The project area was flown by the DWR on June 5, 1989 with an intense search for the nesting of raptors (see Appendix 10-1).

Realistically, nesting habitat does not exist on the project or adjacent areas for many of these species. However, if a species were to nest on or adjacent to the project area, it would have a specific crucial period during which the aeries would need protection from disturbance; this period of time lies between February 1 and August 15. Generally speaking, aeries represent a critical valued site and need protection from significant or continual disturbance within a one-half kilometer radius of the nest. This consideration need only be implemented during the period of time that the nest is occupied.

Golden eagles are a common yearlong resident of the mine plan area. No aerie territories are known inside the 1/2 mile radius of the project area. (Note, an aerie territory is utilized by one pair of eagles but may contain several nest sites).

An active golden eagle nest site is extremely sensitive to disturbance within a one-half kilometer radius. This buffer zone is ranked as being of critical value to maintenance of the eagle population when the bird is actually utilizing the aerie; that period of time is normally between April 15 and June 15. The radius for a buffer zone may need to be increased to one kilometer if a disturbance were to originate from above and within direct line of sight to the eagle aerie.

To date there are no known high-priority concentration areas or critical roost trees for golden eagles on the project area. The mine plan and adjacent areas have been ranked as being of substantial value to golden eagles.

The northern bald eagle is an endangered winter resident (November 15 to March 15) of the local area. To date there are no known high-priority concentration areas or critical roost trees for this species on or adjacent to the project. There does exist a high-priority winter concentration area adjacent to the project area. The access route to the project area dissects this use area. The mine plan area has been ranked as being of substantial value to wintering bald eagles. There are two known nesting areas along the Colorado River. Historic data documents nesting activity by these birds in the State. There is no known historic evidence of the northern bald eagle nesting on the mine plan or adjacent areas.

The American peregrine falcon (relative abundance is endangered) and the prairie falcon (relative abundance is common) are yearlong residents of the mine plan and adjacent areas. Each of these species utilized cliff nesting sites. To date there are no known aerie sites for cliff nesting falcons on the project area. However, marginal nesting habitat for the prairie falcon may exist on the project area. Suitable nesting habitat for the American peregrine falcon cannot be found on the mine plan and adjacent areas. Since a prairie falcon's existence on the area would not be unlikely, the project area has been ranked as being of substantial value to this falcon. It only represents a limited value use area for peregrines.

For each falcon their aerie site wile being utilized are one-half kilometer radius away from the project area and could be ranked as being of critical value to maintenance of their populations. The falcon's period of use at the aerie site spans the spring and early summer period-prairie falcon, April 15 to June 30; peregrine falcon, March 1 to June 30.

The endangered arctic peregrine falcon is a winter resident (November 15 through March 15) of the local area. This species has not been observed to utilize the environs on or adjacent to the mine plan area, however, its occasional presence would not be unlikely. Therefore, the project area is ranked as being of limited value to this species.

The blue grouse is a yearlong resident of the project area. Adult birds prefer open stands of conifers. During winter the blue grouse feeds exclusively upon needles and buds of douglas-fir and spruce trees. Thus, this wildlife habitat (spruce-fir forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February.

Blue grouse annually exhibit what has been termed as reverse vertical migration. That is, during the spring months, they migrate from the high elevation spruce-fir habitat to lower elevation sagebrush, pinion-juniper or shrubland habitats. This movement is caused by a need of the birds to feed on early developing vegetation. Such movement also facilitates successful breeding, nesting and brooding of their young. Then as the year progresses, they move to the higher elevations.

The males are polygamous and will set up and defend territories for booming and breeding activities against other breeding males. Such territories are critical to maintenance of the population during the crucial period of mid-March through mid-June.

After breeding the female develops a nest site which is secreted on the ground; the nest is of critical value to maintenance of the blue grouse population. Upon hatching, which occurs in late May and early June, the young accompanied by the hen immediately leave the nest. The young blue grouse while being brooded rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to blue grouse. The crucial period extend from hatching into mid-August.

As summer progresses into the fall season the grouse consumes large quantities of berries.

The ruffed grouse is a yearlong resident of the project area. These grouse are usually found in the continuum of habitats extending from aspen to shrubland types. But, during winter they often roost in dense stands by conifers. Generally speaking ruffed grouse prefer habitats lying within 0.25 mile of a stream course; such areas are ranked as being of high-priority value to their population. During winter the ruffed grouse feeds exclusively upon staminate aspen buds. Thus, this wildlife habitat (aspen forest) is ranked as being of critical value to over-winter survival of the population during the crucial period of December through February. During the remainder of the year their diet shifts to include a wide variety of plant and insect material.

Ruffed grouse do not exhibit any type of seasonal migration. The males are polygamous and will set up and defend territories against other breeding males. The focal point for breeding activity is the drumming log; all such logs are ranked as being of critical value to grouse since they represent sites of historical use. Such territories are critical to maintenance of the population during the crucial period of early March through May.

After breeding the female develops a nest site which is secreted on the ground and deep within an aspen grove; the nest is of critical value to maintenance of the ruffed grouse population. Upon hatching, which occurs in late May and early June, the young accompanied by the hen immediately leave the nest. The young ruffed grouse while being brooded rely heavily on insects for their protein needs during the first several months of development. The adult bird also shifts its diet during this period to include a high proportion of insects. Brooding areas are ranked as being of high-priority value to ruffed grouse. The crucial period for brooding extends from hatching into mid-August.

The band-tailed pigeon is a summer resident of the project area. This bird is seldom observed to utilize the Wasatch Plateau, but when observed the species is only represented by a single bird, pairs or even less frequently a small flock. Since the band-tailed pigeon's use of the Wasatch Plateau is best described as "occasional", the environs associated with the project are only ranked as being of limited value to the bird. Nesting birds secret their nest in trees within the spruce-fir wildlife habitat. Peak on-nest activity occurs in late July and early August.

Mourning doves normally inhabit the project and adjacent areas, which represent a substantial valued use area for these birds, between May 1 and September 15 each year. They nest throughout most of this period and each pair produces two clutches. The pinion-juniper and riparian habitats are ranked as being of high-priority value for nesting. Locally, mourning doves show two peeks in on-nest activity - early July and early August. Successful nesting activities and any water sources are critical to maintenance of the mourning dove population.

The yellow-billed cuckoo is a summer resident of the project area. This bird only nests in the riparian wildlife habitat, therefore, such areas are of critical value to maintenance of this species. Little is known concerning the yellow-billed cuckoo. Its nest is represented by a frail, saucer shaped structure of twigs and is always placed in brush or trees.

The black swift is a summer resident of the Wasatch Plateau. The montane ecological association represents the swift's substantial values use area. Normally, the bird is associated with a small flock that represents a colony. Black swifts are usually observed soaring as pairs and they feed upon flying insects. A colony's nests are scattered along precipitous terrain where the nest is often secreted behind a waterfall. Such a moist habitat is not known to exist on the project area. Cliff and talus wildlife habitats are ranked as being of high-priority value to the black swift. There is evidence that pair bonds are long lasting and that a nest may be utilized in successive years.

The belted kingfisher is a yearlong resident of the project area. It is found only along riverain systems and its substantial value use area extends from the cold desert through the submontane and into the montane ecological associations. Therefore, the riparian wildlife habitat represents a high-priority valued use area for this bird. It feeds exclusively upon fish. The kingfisher's nest is always secreted within a burrow along stream banks thus, dirt bank habitats along riparian areas are of critical value to this bird.

The pileated woodpecker is a species having high federal interest pursuant to 43 CFR 3461.1 (n-1). The spruce-fir and aspen wildlife habitats of the montane ecological association represent this bird's substantial valued use area. It is important to note that the pileated woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a yearlong resident with a relative abundance considered to be rare.

The Williamson's sapsucker is another species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Typically, the substantial valued use area for this species is the spruce-fir habitat of the Hudsonian life zone in the montane ecological association. Therefore, the

spruce-fir habitat of the Canadian life zone on the project site would only represent the substantial valued use area for the yellow-bellied sapsucker. The yellow-bellied sapsucker is a yearlong resident of the environs associated with the project area and it has a relative abundance considered to be common. Where as the Williamson's sapsucker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the Williamson's sapsucker is known to exist, it is a summer resident with a relative abundance considered to be uncommon.

The Lewis woodpecker is also another species having high federal interest pursuant to 43 CFR 3461.1 (n-1). Its substantial valued use area is represented by riparian habitats characterized by cottonwood stands and ponderosa forests. These habitats do not exist on the project site. It is important to note that the Lewis woodpecker has never been documented to utilize the environs of the biogeographic area that surrounds the project site. In areas of the State where the bird is known to exist, it is a summer resident or only a transient. Its relative abundance is unknown.

The purple martin is a summer resident known to inhabit the environs of the biogeographic area that surrounds the project site. In Utah its substantial valued use area is represented by open spruce-fir, aspen or ponderosa forest habitats of the montane ecological association. The purple martin feeds on flying insects and may secret its nest within any suitable above ground cavity.

The western bluebird is an uncommon summer resident known to inhabit the environs of the biogeographic area that surrounds the project site. Where as the mountain bluebird is a common yearlong resident of the area. Both birds are cavity nesting species. The western bluebird nests from the pinion-juniper habitat of the submontane ecological association up into the lower forest habitats within the Canadian life zone of the montane ecological association. The mountain bluebird utilizes the same continuum of habitats for nesting, but also extends its nesting use across the Canadian and Hudsonian life zones and into the Alpine life zone. During winter both species show elevational and longitudinal migrations; they then utilize all habitats associated with the cold desert ecological association. Therefore, the substantial valued use area for each species spans a broad continuum of habitats. It is important to note that trees with cavities located on the project area can be of critical value to bluebirds.

The grasshopper sparrow is a rare transient species known to inhabit the environs of the biogeographic area that surrounds the project site. It only frequents dry grassland areas in the desert scrub habitat of the cold desert and possibly into the submontane ecological association during spring and fall migration periods. Since its use of such sites is best described as "occasional", those habitats in the region are only ranked as being of limited value to the birds.

### 10.3.2.4 Reptiles and Amphibians

Reptiles

Eighteen species of reptiles, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that sixteen of these species inhabit the project area.

The Utah milk snake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the upper Sonoran (cold desert life zone) through the submontane (Transition life zone) and into the montane (Canadian and possibly Hudsonian life zone) ecological association. Although its use area spans a multitude of habitats, the animal is extremely secretive, mostly nocturnal and is often found inside or under rotten logs, stumps, boards, rocks or within other hiding places. At night they can be found in the open where they hunt for small rodents, lizards and other small snakes. Occasionally, the milk snake may take small birds or bird eggs.

The milk snake may live beyond twenty years and it becomes sexually mature during its third spring season. After mating, which occurs during spring or early summer when they are leaving the den, female milk snakes produce clutches which average seven eggs. The eggs are secreted in a moist warm environ and then abandoned; incubation lasts 65 to 85 days. The site where an individual snake has deposited its clutch of eggs is of critical value to maintenance of the species.

The Utah Mountain King Snake is a yearlong resident animal of the project area. Its substantial value use area encompasses all wildlife habitats extending from the submontane (Transition life zone) into the montane (Canadian and possibly Hudsonian life zone)ecological association. Little is known concerning this animal except that it frequents areas of dense vegetation and that it is often found near water. Its life history and food habits parallel that described for the Utah milk snake.

To date snake dens, which are protected and of critical value to snake populations, have not been identified on or adjacent to the project area. It is important to note that inventory for such has not been attempted. If the company at some later time discovers a den it should be reported to the Utah Division of Wildlife Resources. If a den(s) is currently known, its location must be included with the permit application.

No reptiles have relative abundances that are so low to have caused the animal to be federally listed as a threatened or endangered species.

Amphibians

Six species of amphibians, all of which are protected, are known to inhabit the biogeographic area in which the mine plan and adjacent areas are located. It is probable that all of these species inhabit the project area. Only one species of the amphibians inhabiting the project area have been determined to be of high interest to the State of Utah.

The tiger salamander is a yearlong resident animal of the project area. The substantial value use area for the adult form is represented by any moist underground site or any similar habitat such as inside rotten logs, cellars or animal burrows. Such sites can be found within any wildlife habitat extending from the cold desert (upper Sonoran life zone) through the submontane (Transition life zone) and into the montane (Canadian life zone) ecological association. The larva form, often referred to as a mud-puppy, is a gilled animal that must remain in water within the above described ecological associations. It is interesting to note that the larva may fail to transform into an adult, even after their second season, and they can breed in the larva condition.

Once the larva is transformed into the adult form the animal is primarily terrestrial. Salamanders do migrate to water in the spring for breeding and may remain there during much of the summer. Such as intensive use area would be ranked as being of high-priority value to the animal. In September the newly transformed animals leave the water to find suitable places to spend the winter.

The tiger salamander breeds from March through June and is sexually mature after one year. The male deposits a small tent-shaped structure containing a myriad of sperm on the pool bottom. During courtship the female picks up this structure in her cloaca; then the eggs are fertilized internally before or just at the time they are laid. The eggs, singly or in small clusters, adhere to submerged vegetation; after 10 to 12 days they hatch . Obviously, a critical period for maintenance of the population is when breeding salamanders, eggs or their larva are inhabiting a water.

Post-embryonic development of a salamander's larval form progresses at a pace somewhat controlled by water temperature; in some cold waters the larva may not transform into an adult and drying up of a pool may hasten the process.

Migration to or from water usually occurs at night, during or just after a rain storm. When inhabiting terrestrial sites the tiger salamander is most active at night, particularly on rainy nights, from March through September.

Larva, when small feed on aquatic invertebrates and become predacious to the point of cannibalism when they are larger. Food items for adults include insects, earthworms and occasionally small vertebrates.

No amphibians have relative abundances that are so low to have caused the animal to be endangered by disturbance by mining operations.

#### 10.3.2.5 Aquatic Organisms

No fish were seen or collected in either the Gordon Creek or Beaver Creek (DWR, 1981a).

The benthic macroinvertebrate community of Gordon Creek was surveyed in late April 1981. Data was collected at stations above and below the North Fork Gordon Creek in order to evaluate possible effects of drainage through the mine affected area.

Site NFG-1 was located about 250 m above the Bryner Creek confluence, in the vicinity of remnants of an earlier mining episode. The main flow pattern was riffle, although a few small pools were formed behind larger boulders and along the banks. Mean water depth was 35 cm, and stream width averaged 2.1 m. In the sample area, rubble dominated the substrate, but sand gravel, and a few boulders were also present. Slow velocity areas had a small amount of silt on the substrate. Riparian vegetation was scattered and provided an incomplete canopy. Primarily riparian species were Quaking Aspen, Blue Spruce, and willows on the north bank, and Gamble's Oak and Quaking Aspen on the south bank. Banks were eroded and void of vegetation on several bends in the site area.

Twenty taxa of seven major groups were found at Site NFG-1 in three pooled Surber samples (Appendix 10-2, Table 1). The midge Chironomidae (Diptera) and the mayfly Cinygmula sp. (Heptageniidae) were the most common aquatic invertebrates collected (33.9 percent and 21.2 percent, respectively). Early instars of the stonefly family Perlodidae, the mayfly Baetis sp. (Beatidae), and caddisflies Hydropsyche sp. (Hydropsychidae) and Oligophleboides sp. (Limnephilidae), and the crane fly Antocha sp. (Tipulidae) were moderately common (2.4 percent, 5.7 percent, 12.1 percent, 16.0 percent, and 2.0 percent, respectively).

Moderately high readings of alkalinity, hardness, and pH were obtained. Dissolved oxygen and water temperature were not abnormal (Appendix 10-2, Table 2).

Site NFG-2 was located about 30 m below a water withdrawal point and old concrete abutments, several pools were within the area sampled, but riffles were the dominate flow pattern. Average stream width and depth were 2.8 m and 20 cm, respectively. Rubble and gravel were the primary substrate types in the riffles, while sand and silt were the main substrate in the pools and had partially filled the interstitial spaces among rubble in the riffles. Dense willow stands provided an almost complete canopy over the stream in the study site.

The aquatic invertebrate community of Site NFG-2 was much less diverse and had significantly fewer members then Site NFG-1 (Appendix 10-2, Table 1). In the three pooled Surber samples Baetissp. was the most abundant organism (63.6 Percent); Oligochaeta and Hesperophylax sp. (Limnephilidae were moderately common (14.5 percent and 9.1 percent, respectively). All other taxa were represented by less than five individuals.

Dissolved oxygen, alkalinity, and pH were slightly higher than at Site NFG-1 (Appendix 10-2, Table 2). Hardness and water temperature were not different.

The aquatic invertebrate communities were significantly different at the two sites. The probable reason for the change was the increased sediment load at the lower site to which the unpaved roads may contribute. However, much of the siltation is probably natural, since the stream and its tributaries drain areas of relatively erodible soils. In addition, "riparian" vegetation changes from aspen, conifers, and dense shrubs to more open stretches often dominated by sagebrush with only scattered trees.

The conclusion that the shift of macroinvertebrates is related to siltation is supported by the ecologies of certain key species. The best example is the reversed abundances of Cinygmula

sp., which is best suited for clinging to coarse substrata, and Baetis sp., which is ambulatory and thus able to move freely along a silty bottom.

Macroinvertebrates in the Beaver Creek drainage were sampled in late April and middle June 1981 at stations about 1 km above (BC-1), less than 50 m above (BC-2, and about 1 km below the confluence with an unnamed tributary in extreme northwestern Section 18. For convenience, the unnamed tributary is referred to in this report as "Spring Creek" the site on this tributary is identified as SC-1.

Site BC-1 was located near the western edge of the study area, in southeastern Section 2. Both Beaver Creek and the intermittent tributary joining it near BC-1 were essentially dry above the junction itself.

Riparian vegetation through this stretch was primarily wet grasses (Subalpine Moist Meadow), but aspen and conifers were scattered along the creek and provided a spotty canopy. Substrate was mainly gravel and small rubble, with a thin silt overburden in slow stretches. The dominant flow pattern was riffle, but the low gradient reduced velocity to about 0.5 m/sec. Mean stream with and depth were 60 cm and 5 cm, respectively.

The invertebrate community was composed of sixteen taxa. Chironomidea were the most common organism (71.9 percent of sample). All other taxa occurred in comparatively low numbers but the planarian Polycelis coronata, oligochaetes, the stonefly Zapada, the mayflies Beatis and Cinygmula, and caddisfly Rhyacophila, and the cranefly Dicranota were represented in moderate numbers (Appendix 10-2, Table 3). The water at BC-1 was slightly alkaline, and temperature was 14 degrees C. in June (Appendix 10-2, Table 4).

Site BC-2 was located just below several active and inactive beaver ponds and just above the confluence with Springs Creek. The banks at and above BC-1 were eroded and unstable, apparently partly due to realignment of the stream because of the beaver activity. Heavy use of the area by livestock probably contributed to this condition. Riparian Blue Spruce, Subalpine Fir, and willows provided a partial canopy; branches from terrestrial fall-in and broken beaver dams cluttered the stream, but there were relatively few leaf packs. Gravel and rubble were the most common substrate constituents, and silt covered coarse substrata in slow-velocity reaches. The slight gradient and meandering character of the stream near BC-2 resulted in several pools, but the dominant flow pattern was riffle. Mean stream width and depth were 50 cm and 10 cm, respectively. Depth of pools did not exceed 45 cm.

The mayfly Baetis sp. was the most abundant organism collected at BC-2 (44.0 percent), but six taxa (Planariidae, Oligochaeta, Cinygmula sp., Rhycophila sp., Hesperophylax sp., and Chironomidae) occurred in moderate numbers.

The water at BC-2 remained slightly alkaline, but the slower flows and limited shading resulted in warmer temperatures of 17.5 degrees C. in June (Table 4, Appendix 10-2).

Site BC-3 was located in an area where the valley was broader and the stream was incised. The most common vegetation on the flood plain was sagebrush, and shade was provided only

where the stream ran along the foot of a forested north-facing slope. Poor bank stability resulted in a layer of fine sediments over the native gravel rubble substrate. In pools the substrate was primarily sand and silt. Mean stream width was 90 cm; depth ranged from 10 cm in riffle-runs to 50 cm in pools. Several tree limbs were in the water, but there was little leaf litter.

At least twenty-two invertebrate taxa were collected at BC-3 and no single taxon dominated the community. Chironomids, the most common form, and the amphipod Crangonyx, accounted for only 26.8 percent and 20.3 percent of the invertebrates collected. Five taxa (Oligochaeta, Baetis sp., Cinygmula sp., Hydropsyche sp.) were moderately abundant (Table 3).

Chemical characteristics of the water at BC-3 were not significantly different from those recorded at upstream sites, except that water temperature was slightly higher at 20 degrees C. (Table 4).

Site SC-1 was located on the unnamed tributary ("Spring Creek"), approximately 50 m above its confluence with Beaver Creek and just below the spring which provides most (about 75 percent) of its flow, and its unofficial name. Above the spring, most of the flow was from snowmelt during both the late April and middle June surveys. The stream was marked by several abandoned and barely distinguishable beaver ponds, none of which appeared to have held water for a number of years (based on vegetational re-establishment). Scattered Blue Spruce shaded portions of the stream, and grasses retained the banks. The substrate was primarily sand and gravel interspersed with a few larger stones. Width was not greater than 60 cm, and depth did not exceed 6 cm. The main flow pattern was run; no true pools were present in the sampled stretch.

The mayfly Baetis sp. and chironomids were the most common (51.2 percent and 23.0 percent, respectively) of the sixteen taxa collected at the site. Oligochaeta, Cinygmula sp., Ceratopogonidae, and Dicranota sp. were found in moderate numbers. A caddisfly Oligophlebodes, and a mothfly, Psychodidae, were unusual occupants of the creek (Table 3).

The chemical characteristics of the water in the unnamed tributary were similar to those of Beaver Creek; the markedly colder temperature (1 degrees C.) was related to its proximity to a spring and the fact that data were recorded in April at that site, versus June at the Beaver Creek Site.

The invertebrate community of the creek changed notably in a downstream direction. Site BC-1 produced the greatest number of organisms, but community diversity was lower than at downstream sites. Nor were the downstream communities as completely dominated by one or two taxa as was BC-1. The invertebrate community of the unnamed tributary was more similar to that of BC-1 than to BC-2 and BC-3.

The differences in community composition and structure probably were at least partially attributable to the overall character of the aquatic habitat. Site BC-1 was in a typical subalpine zone, but at BC-2 and BC-3 the creek had emerged into a more open,

sagebrush-dominated terrestrial area with more erodible streambed material. Between BC-1 and BC-3, several beaver ponds interrupted flow patterns, contributed to high water temperatures, and altered the nutrient production and transport capabilities of the stream.

Relatively low diversity and chironomid dominance of the BC-1 invertebrate community was partially a function of the ephemeral character of the stream in its upper reaches.

Streams subject to periodic desiccation are less likely to support a diverse community than perennial streams and only those forms adapted to survival in such areas are likely to be successful.

Although sedimentation was greater at BC-2 and BC-3 than at BC-1, the greater physical stability of the system in the lower reaches contributed to greater community diversity. Moreover, sediment transport probably did not exceed threshold tolerances of most invertebrates occupying the lower reaches. Additionally, the reduced riparian canopy below BC-1 and the beaver ponds enhanced autochthonous productivity for the benefit of the invertebrate communities in the lower reaches. Such a change in the energy dynamics of the system would allow forms unable to survive the "oligotrophic" upper reaches to survive the more nutrient-enriched lower reaches.

Site BC-1 had no taxa unique to it, but two forms (Hydracarina and Chloroperlidae) were shared only with Site SC-1. In contrast, at least fourteen taxa were found only at Sites BC-2 and/or BC-3. An explanation may be that lligophlebodes sp. and Psychodidae are not particularly common forms.

However, differences between the communities of the unnamed tributary and Sites BC-2 and BC-3 may be an artifact of season sampled rather than actual differences. Each form peculiar to Site SC-1 very likely occurs in Beaver Creek but had already hatched when Beaver Creek was sampled six weeks later.

Seven forms (Oligochaeta, Baetis sp., Cinygmula sp., Hesperophylax sp., Chironomidae Tipula sp., and Dicranota sp.) were common to all sites. Each is a relatively large group, has representatives in a variety of habitats, and is widely distributed.

More intensive sampling of Beaver Creek and its unnamed tributary probably would reduce the number of taxa limited to particular reaches, but the patterns discerned would remain similar.

### 10.3.3 Species of Special Significance

See Tables 10-1 and 10-2.

#### 10.3.3.1 Threatened and Endangered Species

Listed threatened and endangered 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

**TABLE 10-1**

**Federally Listed and Proposed Endangered Species in Utah**
**January 15, 1995**

| Mammals | | Status |
|---|---|---|
| Black-footed ferret[1] | Mustela nigripes | E |
| Utah prairie dog | Cynomys parvidens | T |
| **Birds** | | |
| American peregrine falcon[2, ] | Falco peregrinus anatum | E |
| Bald eagle[4, 10] | Haliaeetus leucocephalus | E |
| Southwestern willow flycatcher[6] | Empidonax tralii extimus | PE |
| Whopping crane[3] | Grus americanus | E |
| Mexican spotted owl | Strix occidentalis lucida | T |
| **Fish** | | |
| Bonytail chub[5] | Gila elegans | E |
| Colorado squawfish[5] | Ptychocheilus lucius | E |
| Humpback chub[5] | Gila cypha | E |
| Lahontan cutthroat trout | Oncorhynchus (Salmo) clarki henshawi | T |
| June sucker[5] | Chasmistes liorus | E |
| Razorback sucker[5] | Xyrauchen texanus | E |
| Virginia River chub | Gila robusta seminuda | E |

**TABLE 10-1**

**Federally Listed and Proposed Endangered Species in Utah** (Continued)

| Fish | | Status |
|---|---|---|
| Virgin spinedace | Lepidomeda mollispinis mollispinis | PT |
| Woundfin | Plagopterus argentissimus | E |
| **Reptiles** | | |
| Desert tortoise[5] | Gopherus agassizi | T |
| **Snails** | | |
| Kanab ambersnail[6] | Oxyloma haydeni kanabensis | E |
| Utah valvata snail[8] | Valvata utahensis | E |

[1]Known historically, including two confirmed sightings in Utah in 182.
[2]Nests in Utah.
[3]Migrates through Utah, no resident populations.
[4]Wintering populations (only three known nesting pairs in southeastern Utah).
[5]Critical habitat designated.
[6]Critical habitat proposed.
[7]Emergency listing.
[8]Only known historically.
The Arctic Peregrine falcon is protected as endangered (Utah) or threatened while migrating through the 48 conterminous states under similarity of appearance provision.
[10]The bald eagle was proposed to be downlisted to threatened in Utah as of 14.

E - Endangered PE - Proposed Endangered T - Threatened PT - Proposed Threatened

For additional information contact: U.S. Fish and Wildlife Service, 145 East 1300 South, Salt Lake City, Utah 84115, Telephone: (801)524-5001

**TABLE 10-2**

**Native Utah Wildlife Species of Special Interest**
**Revised 1990#**

| Mammals | | Status |
|---|---|---|
| Grizzly Bear | Ursus horribilis | EX |
| Fisher | Martes pennanti | EX |
| Black-footed Ferret* | Mustela nigripes | EN |
| Wolf | Canis lupus | EN |
| Utah Prairie Dog* | Cynomys parvidens | T |
| Dwarf Shrew | Sorex nanus | S |
| Desert Shrew | Notiosorex crawfordi | S |
| Red Bat | Lasiurus borealis | S |
| Mexican Big-eared Bat | Plecotus phyllotis | S |
| Spotted Bat | Euderma maculatum | S |
| Big Free-tailed Bat | Tadarida macrotis | S |
| Abert's Squirrel | Sciurus aberti navajo | S |
| Belding's Ground Squirrel | Spermophilus beldingi | S |
| Richardson Ground Squirrel | Spermophilus richardsoni | S |
| Thirteen-lined Ground Squirrel | Spermophilus tridecemlineatus | S |
| Spotted Ground Squirrel | Spermophilus spilosoma | S |
| Yellow Pine Chipmunk | Eutamias amoenus | S |
| Rock Pocket Mouse | Perognathus intermedius | S |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Mammals (Continued)** | | **Status** |
|---|---|---|
| Wyoming Pocket Mouse | Perognathus fasciatus | S |
| Merriam's Kangaroo Rat | Dipodomys merriami | S |
| Desert Kangaroo Rat | Dipodomys deserti | S |
| Cactus Mouse | Peromyscus eremicus | S |
| Rock Mouse | Peromyscus difficilis | S |
| Southern Grasshopper Mouse | Onychomys torridus | S |
| Stephen's Woodrat | Neotoma stephensi | S |
| Mexican Vole | Microtus mexicanus | S |
| Wolverine | Gulo gulo | S |
| River Otter | Lutra canadensis | S |
| Canada Lynx | Lynx canadensis | S |
| **Birds** | | |
| Passenger Pigeon | Ectopistes migratorius | E |
| California Condor | Gymnogyps califronianus | EX |
| American Peregrine Falcon* | Falco peregrinus anatum | EN |
| Bald Eagle* | Haliaeetus leucocephalus (Linnaeus) | EN |
| Whooping Crane* | Grus americana | EN |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Birds (Continued)** | | **Status** |
|---|---|---|
| Arctic Peregrine Falcon | Falco peregrinus tundrius | T |
| Mountain Plover | Charadrius montanus | S |
| Snowy Plover | Charadrius alexandrinus | S |
| Long-billed Curlew | Numenius americanus | S |
| Yellow-billed Cuckoo | Coccyzus americanus | S |
| Lewis' Woodpecker | Melanerpes lewis | S |
| Western Bluebird | Sialia mexicana | S |
| Ferruginous Hawk | Buteo regalis | S |
| Swainson's Hawk | Buteo swainsoni | S |
| American White Pelican | Pelecanus erythrorhynchos | S |
| Double-crested Cormorant | Phalacrocorax auritus | S |
| Caspian Tern | Sterna caspia | S |
| Purple Martin | Progne subis | S |
| Bell's Vireo | Vireo bellii | S |
| Grasshopper Sparrow | Ammodramus savannarum | S |
| Greater Roadrunner | Geococcyx californianus | S |
| Spotted Owl | Strix occidentalis | S |
| Osprey | Pandion haliaetus | S |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Birds (Continued)** | | **Status** |
|---|---|---|
| White-faced Ibis | Plegadis chihi | S |
| Great Blue Heron | Ardea herodias | SQ |
| American Bittern | Botaurus lentiginosus | SQ |
| Western Grebe | Aechmophorus occidentalis | SQ |
| Black-crowned Night Heron | Nycticorax nycticorax | SQ |
| Pileated Woodpecker | Dryocopus pileatus | SQ |
| Red-headed Woodpecker | Melanerpes erythrocephalus | SQ |
| Mountain Bluebird | Sialia currucoides | SQ |
| Yellow-breasted Chat | Icteria virens | SQ |
| Fox Sparrow | Passerella iliaca | SQ |
| **Fish** | | |
| Utah Lake Sculpin | Cottus echinatus | E |
| Bonytail Chub* | Gila elegans | EN |
| Colorado Squawfish* | Ptychocheilus lucius | EN |
| Humpback Chub* | Gila cypha | EN |
| Woundfin* | Plagopterus argentissimus | EN |
| June Sucker* | Chasmistes liorus mictus | EN |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Fish (Continued)** | | **Status** |
|---|---|---|
| Virgin River Chub* | Gila robusta seminuda | EN |
| Razorback Sucker* | Xyrauchen texanus | EN |
| Lahontan Cutthroat Trout* (Not native to Utah) | Salmo clarki henshawi | T |
| Least Chub | Iotichthys phlegethontis | T |
| Virgin River Spinedace | Lepidomeda mollispinis | T |
| Leatherside Chub | Gila copei | S |
| Bear Lake Sculpin | Cottus extensus | S |
| Roundtail Chub | Gila robusta robusta | S |
| Colorado Cutthroat Trout | Salmo clarki pleuriticus | S |
| Bonneville Cutthroat Trout | Salmo clarki utah | S |
| Bonneville Cisco | Prosopium gemmiferum | S |
| Bonneville Whitefish | Prosopium spilonotus | S |
| Bear Lake Whitefish | Prosopium abyssicola | S |
| Piute Sculpin | Cottus beldingi | SQ |
| **Reptiles and Amphibians** | | |
| Relict Frog | Rana onca | E |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Reptiles and Amphibians (Continued)** | | **Status** |
|---|---|---|
| Gila Monster | Heloderma suspectum | EN |
| Desert Tortoise* | Gopherus agassizi | EN |
| Western Spotted Frog | Rana pretiosa | T |
| Desert Iguana | Dipsosaurus dorsalis | S |
| Chuckwalla | Sauromalus obesus | S |
| Desert Night Lizard | Xantusia vigilus | S |
| Western (Utah) Banded Gecko | Coleonyx variegatus utahensis | S |
| Zebra-tailed Lizard | Callisaurus draconoides rhodostictus | S |
| Many-lined Skink | Eumeces multivirgatus gaigeae | S |
| Plateau Whiptail | Cnemidophorus velox | S |
| Arizona Toad | Bufo microscaphus microscaphus | S |
| Pacific Tree Frog | Hyla regilla | S |
| Speckled Rattlesnake | Crotalus mitchellii pyrrhus | S |
| Mojave Rattlesnake | Crotalus scutulatus scutulatus | S |
| Sidewinder Rattlesnake | Crotalus cerastes cerastes | S |
| Utah Black-headed Snake | Tantilla planiceps utahensis | S |
| California Kingsnake | Lampropeltis getulus californiae | S |

**TABLE 10-2** (Continued)

**Native Utah Wildlife Species of Special Interest**

| **Reptiles and Amphibians (Continued)** | | **Status** |
|---|---|---|
| Desert Glossy Snake | Arizona elegans | S |
| Utah Blind Snake | Leptotyphlops humilis utahensis | S |
| Mojave Patch-Nosed Snake | Salvadora hexalepis mojavensis | S |
| Arizona Lyre Snake | Trimorphodon lambda | S |
| Utah Mountain Kingsnake | Lampropeltis pyromelena infralabialis | S |
| Utah Milk Snake | Lampropeltis triangulum taylori | S |
| Great Plains Rat Snake | Elaphe guttata emoryi | SQ |
| Western Smooth Green Snake | Opheodrys vernalis blanchardi | SQ |

E - Extinct: Any species that has disappeared in the world.
EX - Extirpated: Any species that has disappeared, as a part- or full-time resident, from the state since 1800.
EN - Endangered: Any species, subspecies or subpopulation which is threatened with extinction resulting from very low or declining numbers, alteration and/or reduction of habitat, detrimental environmental changes, or any combination of the above. Continued survival is unlikely without implementation of special measures.
T - Threatened: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.
S - Sensitive: Any species which, although still occurring in numbers adequate for survival, has been greatly depleted or occurring in limited areas and/or numbers due to a restricted or specialized habitat. A management program, including protection or habitat manipulation, is needed.
SQ - Status Questioned: Insufficient data available on which to base a reliable assessment as to status.

\# List currently under revision, February 15.
* Denotes Federally classified endangered or threatened species found in Utah.

Utah Division of Wildlife Resources, 156 West North Temple, Salt Lake City, Utah 84116-315.

leucocephalus), which winters in Utah. None of the species is likely to occur in the study area, because habitats are marginal. However, areas of potential occurrence include riparian forests for the Bald Eagle, cliff areas in the region for the American Peregrine Falcon, and upland areas for the Arctic Peregrine Falcon. Bald Eagles are known to use riparian woodlands along lower Gordon Creek and the Price River as winter roosts (DWR 1981a). If any endangered or threatened species are found in the permit area they will be promptly reported the Division.

The most likely raptors in the mine area are the Flammulated Owl and Cooper's Hawk, which occur in the Wasatch Plateau and prefer wooded country, such as riparian and conifer forests. With the availability of cliffs for nesting and open areas for hunting within a relatively short distance the Prairie Falcon is a potential breeder in the area.

Williamson's Sapsucker was determined to breed in the study area during 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 1974, Crockett and Hansley 1978), and it has been reported as breeding in "all the mountainous counties of the state' Hayward et al. 1976 p 120). Although no nests were located, the status of Williamson's Sapsucker as a breeder was 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 about 0.5 km west of the mine site in southwestern Section 18. The nest, though not located, is believed to have been in an open stand of mature aspen about 3/8 mi. west-north-west of the mine site.

The Purple Martin (Progne subis) is known to occupy the area during the summer in open conifer or aspen forests in the Wasatch Plateau region. Because these preferred habitats are widespread in the study area, Purple Martins should be expected to occur occasionally. However, none was observed during site-specific field studies.

## 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 disturbance associated with the mining operation will result in minimal habitat loss during the life of the mine. 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 a working mine site. Most of these species are likely to move freely around the mine site when not in operation and to quickly re-inhabit the area after decommissioning.

Two types of mortality potentially are associated with operation of the coal mines; raptor electrocution on unsafe power poles and mammal road kills. A raptor hazard survey was conducted in the area in conjunction with baseline field studies. The results of this survey indicate that the four-phase line running from the substation at the abandoned townsite of National represents a potential hazard because of the closeness of two conductors on one side of the cross-arm (Appendix 10-1). However, the actual hazard probably is slight, because (1)

the positioning of the poles relative to adjacent topography would tend to limit use, (2) most of the raptors commonly present in the area are not frequent users of power line perches, and (3) the least safe pole designs are near the active mine, where raptor use probably is minimal. This conclusion was confirmed by raptor biologist Ron Joseph and Bruce Waddell of the U.S. Fish and Wildlife Service, who visited the site in August 1981.

The power poles below National are somewhat safer, with three well-separated phase lines. However, the ground wire should be clipped to form a 4" - 6" gap below the cross-arm to eliminate the risk. These poles also appeared to receive little use in the study area. A few km to the east, along the haul/access road, these poles are a more prominent feature on the flat landscape (Appendix 10-1) and appeared to receive somewhat more use probably especially during the winter.

Mule Deer road kills along the Gordon Creek haul road have been monitored. In the interval from May 1980 to May 1981, only two deer road kills were recorded; this represents a very small percentage of both the wintering herd and the total population of the game management unit. Most of the road kill problem is along a stretch beginning about 1 - 1.5 km below the turnoff to Coal Canyon. The major factor contributing to mortalities in this stretch is that the road passes through an area of sagebrush, chained pinyon/juniper, and pasture maintained by DWR as winter habitat. The winter herd in this area was about 500 animals in 1980-1981, and deer remained until late spring despite the unusually mild winter (probably to take advantage of emergent alfalfa and range grasses).

Another factor in the higher road kill risk through the "Cedar Bench" section may be that, since the road is fairly straight and flat, trucks tend to go faster than through hillier and curvier sections nearer the mine. Also, much of the road near the mine is bordered by a low cliff, which serves as an effective barrier to deer movement.

Drawings in Appendix 10-1 show areas of heaviest deer crossings, based on track count in winter 1980-1981 and analyses of vegetational and topographic features. Steep cliff faces adjacent to the road serve as effective barriers along parts of Upper North Fork Gordon Creek.

Impacts to aquatic ecosystems have been minor. Gordon Creek apparently has sustained a change in the character of the macroinvertebrates as a result of an increased suspended load along the unpaved road below the mine site. Much of this appears to be naturally related to soil erodibility, although the adjacent road and the water collection point undoubtedly are contributors. The increased siltation below Beaver Creek's Mining Operation has had much less influence on the quality of the Gordon Creek aquatic ecosystem than the low and variable flows.

Beaver Creek has been essentially unaffected by mining or exploratory drilling programs in the Beaver Creek valley. This situation is not expected to change with an additional mining operation.

## 10.5 Mitigation and Management Plans

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 the applicant by DWR.

In order to take extra precautions the following actions will be taken in order to minimize disruption to the wildlife and the habitat surrounding the project:

1. Controlled speed limits on haulage roads to protect wildlife.

2. Wildlife habitats will be revegetated with beneficial species. Trees and shrubs will be planted in clumps to provide shelter. Planting will be done in late fall to encourage growth.

3. Pesticides will be avoided on the mine site.

4. Toxic materials will be safely stored on the mine site. All toxic materials will be fenced to keep wildlife out, and taken to a disposal site.

5. Native plants and berry producing shrubs will be planted for avian species.

6. Raptors and their offspring will be protected from disturbance and subsidence.

7. Electrical and other transmission lines will be designed in accordance with the regulatory guidelines.

8. Due to the length of conveyors there should be no barriers. Cross unders can be installed along the belt lines if needed.

### 10.5.1 Terrestrial Habitats and Wildlife

DWR (1981b) emphasized three basic aspects to migration and impact avoidance for the terrestrial habitats at the mines: habitat and wildlife protection, reclamation, and wildlife management.

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) planting vegetation to create an edge effect by clumping selected shrub or tree species, (4) actually transplanting stock or turf from new disturbed sites to reclaimed sites, and (5) leaving islands of natural vegetation in new disturbed sites.

Wildlife management is important for minimizing harmful effect (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).

Direct impacts on springs and seeps on or adjacent to the permit area are not expected based on past mining experiences in the area. However, if mining operations negatively impact these features, Horizon plans to provide measures for replacement. For alternative water sources in the vicinity. See Chapter 7 for a discussion of the permit area hydrology.

#### 10.5.1.1 Mammals

For small mammals, most of which are secretive and have small home ranges, mitigation will be almost totally related to habitat protection and reclamation (minimizing short and long-term habitat loss). For larger species 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 Horizon Coal Corporation policies against harassing or hunting wildlife in the permit area. These policies will continue throughout the operation of the mine. Sensitive aspects of the ecosystem will be avoided during future exploration, operation, and reclamation activities.

Road kills will be minimized by an employee awareness program, including speed limits and game crossing signs.

#### 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 raptor nests or nest trees will not be disturbed.

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). However, the monitoring program will continue to address this concern. The raptor nesting area located is Sec. 8, T13S, R8E SLM will not have any pillar extraction only development work within 200 ft of the nesting sites. This will eliminate any chance of subsidence under this area.

#### 10.5.1.3 Reptiles and Amphibians

Besides minimizing habitat loss and restoring native vegetation, the principal mitigation measures for herptiles 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 Gordon Creek aquatic ecosystem will be limited by constructing a sediment pond to protect the stream from an increased sediment load from the mine affected area in the North Fork Gordon Creek. Additional details of these procedures for projecting stream quality are provided in Chapter 7 of the mine permit application.

## 10.6 Stream Buffer Zone Determination

The Horizon Mines will be located along a tributary to the Gordon Creek. This tributary meets the Gordon Creek within the permit area. The slight contribution from the improved haul/access road (dust controlled by watering) and the natural soil erosion contribution will not adversely affect the stream's value to terrestrial species. All runoff from the disturbed area will be directed around this stream and treated in a sedimentation pond before being allowed to enter the stream. A buffer zone will be along this rechanneled stream to eliminate any disturbance to the stream (see Chapter 7).

Beaver Creek is an important stream, since it supports at least a limited Cutthroat Trout fishery. The mining operation will not have but a small impact if any on the Beaver Creek, nor should it do so in the future since surface disturbance is limited to the Gordon Creek Drainage. There will be buffer zones in this area.

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# APPENDIX 10-1

# WILDLIFE INFORMATION

APPENDIX 7

Blue Blaze Coal Co.
P.O. Box 784
Price, Utah 84501
Ph. (801) 472-3786

April 30, 1992

Division of Wildlife Resources
455 West Railroad Avenue
Price, Utah 84501

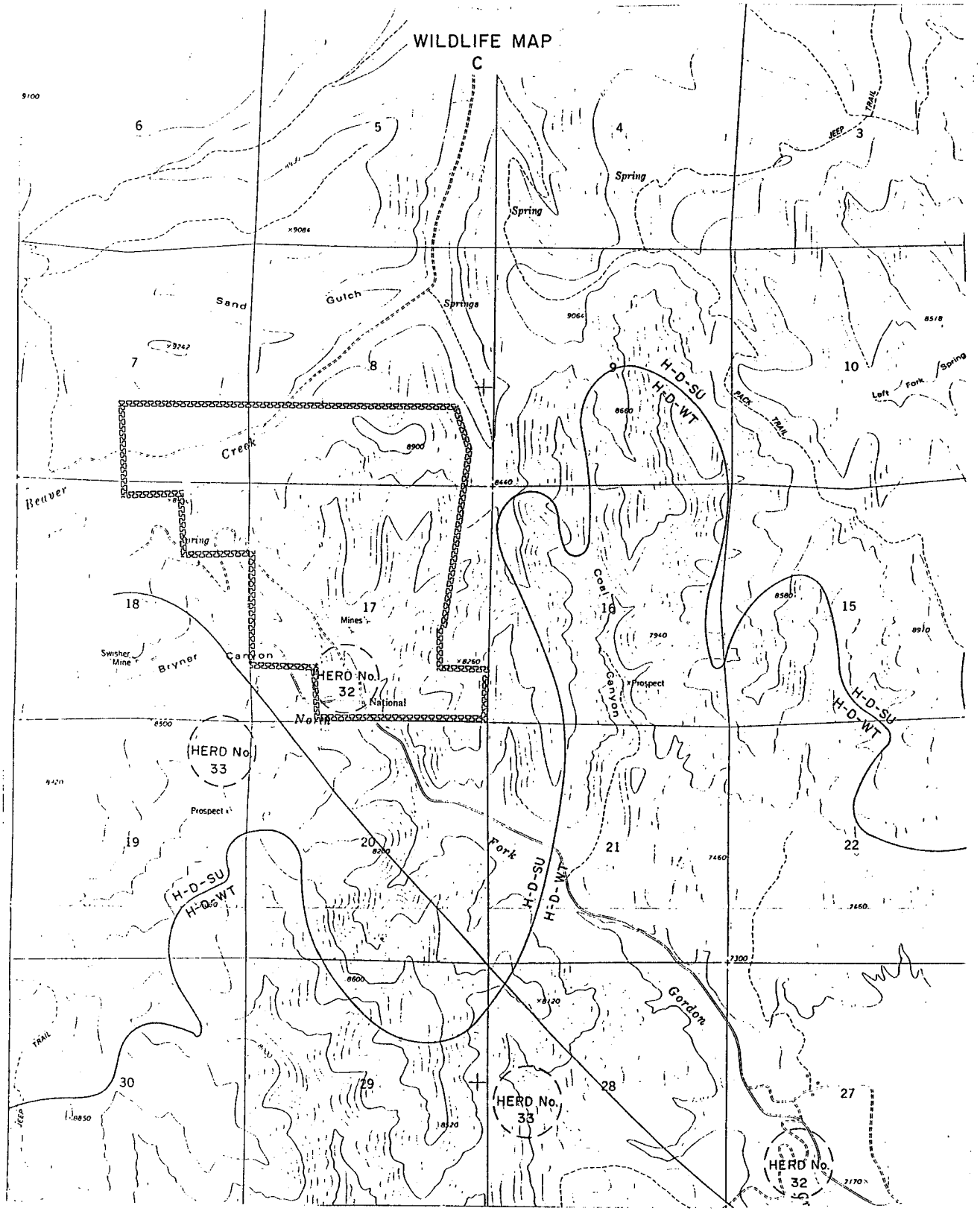
Dear Mr. Bates

As per our conversation on April 27, 1992. It was the interest of the Division of Wildlife Resources of bats that might inhabit the old mine workings of the permit area. As I indicated to you that there are no bats in the old mine workings. This was observed during entering the mine at different seasonal periods throughout the year. As we discussed we were willing to obtain the proper safety equipment so you could enter the mine to make an on-site observation. You indicated that this was not necessary. You also indicated that the time bats could be found in the mine were in the months from May till fall, during these periods no bats or any other animals were observed.

I also indicated that the old fenced mine portals would be used as our mine openings and if the mine was not permitted these portals would be sealed under the abandoned mines reclamation.

Sincerely,

William R. Skaggs




## EXPLANATION

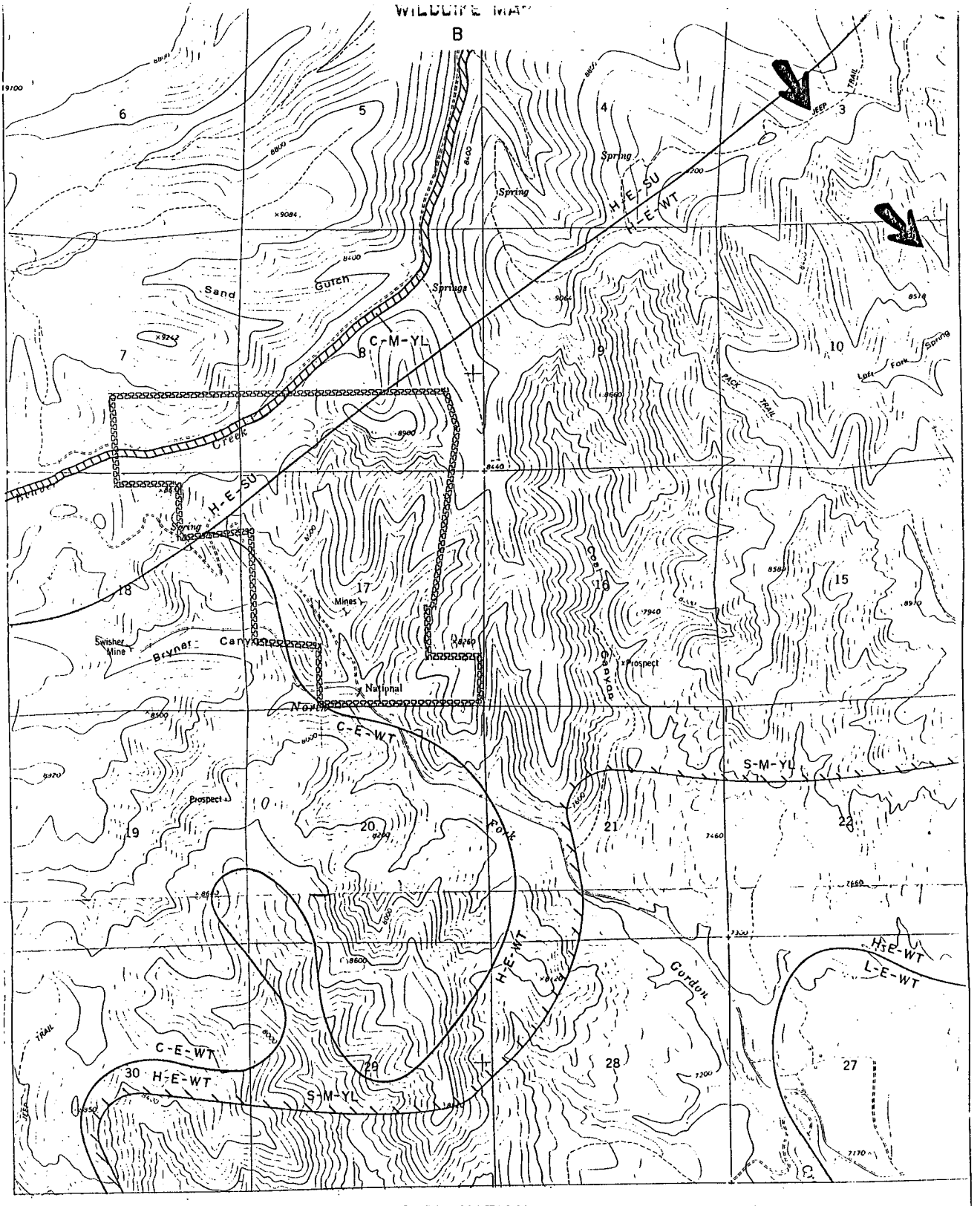
H-D-SU — SEASON USE DESIGNATION
WILDLIFE DESIGNATION
USE AREA RANKING

HERD No. 32 / HERD No. 33 — BOUNDARY DEER HERD UNITS

H-D-SU — BOUNDARY (High-Priority, Deer, Summer)

H-D-WT — BOUNDARY (High-Priority, Deer, Winter)

PERMIT AREA BOUNDARY




## EXPLANATION

H-E-SU — SEASON USE DESIGNATION
WILDLIFE DESIGNATION
USE AREA RANKING

MIGRATION ROUTES

BOUNDARY (Crucial-Critical, Moose, Yearlong)

H-E-SU — BOUNDARY (High-Priority, Elk, Summer)

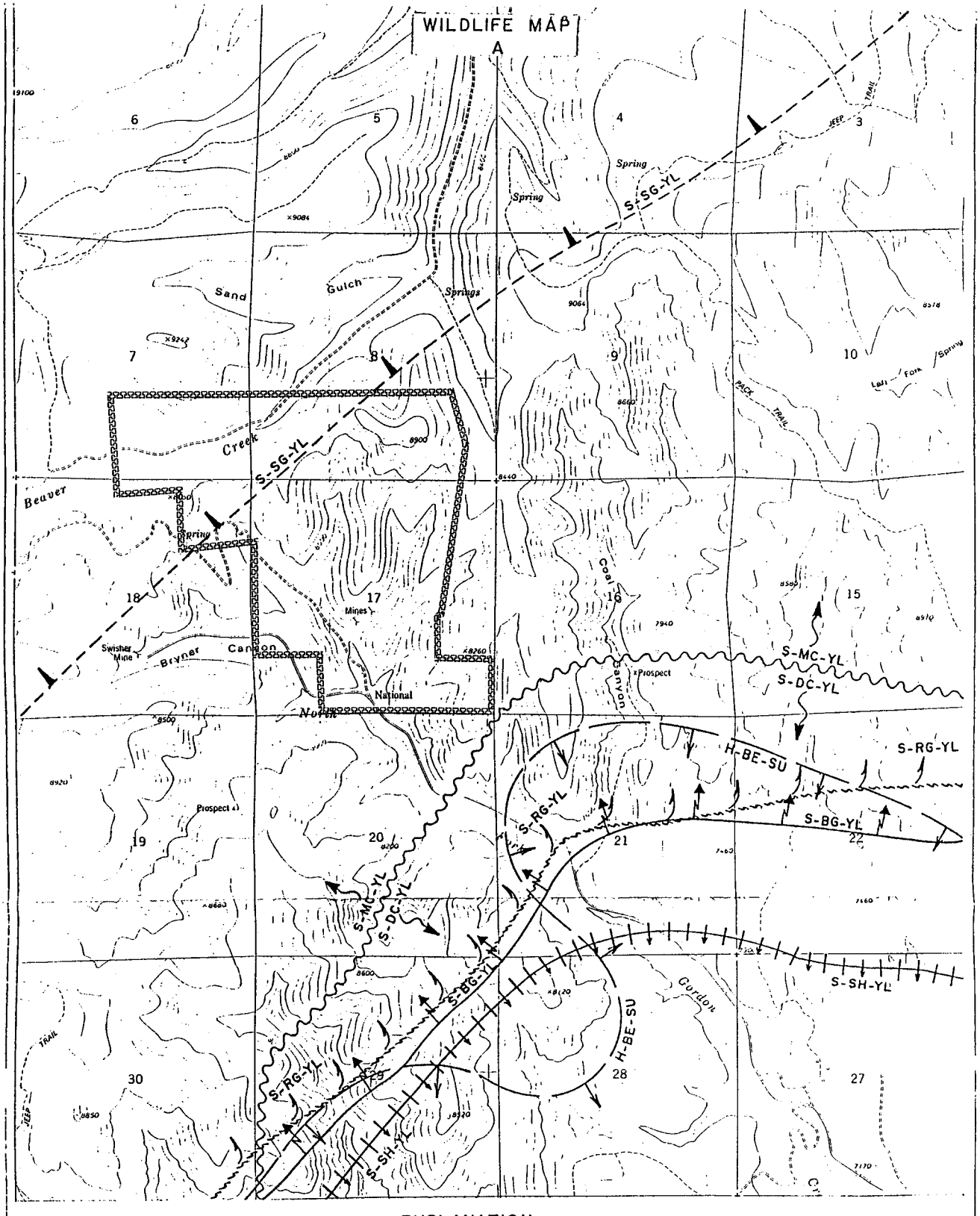
C-E-WT — BOUNDARY (Crucial-Critical, Elk, Winter)

H-E-WT — BOUNDARY (High-Priority, Elk, Winter)

L-E-WT — BOUNDARY (Limited Value, Elk, Winter)

PERMIT AREA BOUNDARY

S-M-YL — BOUNDARY (Substantial, Moose, Yearlong)




## EXPLANATION

S-SG-YL — SEASON USE DESIGNATION
WILDLIFE DESIGNATION
USE AREA RANKING

S-SG-YL — BOUNDARY (Substantial Value, Sage Grouse, Yearlong)

S-SH-YL — BOUNDARY (Substantial Value, Snowshoe Hare, Yearlong)

S-BG-YL — BOUNDARY (Substantial Value, Blue Grouse, Yearlong)

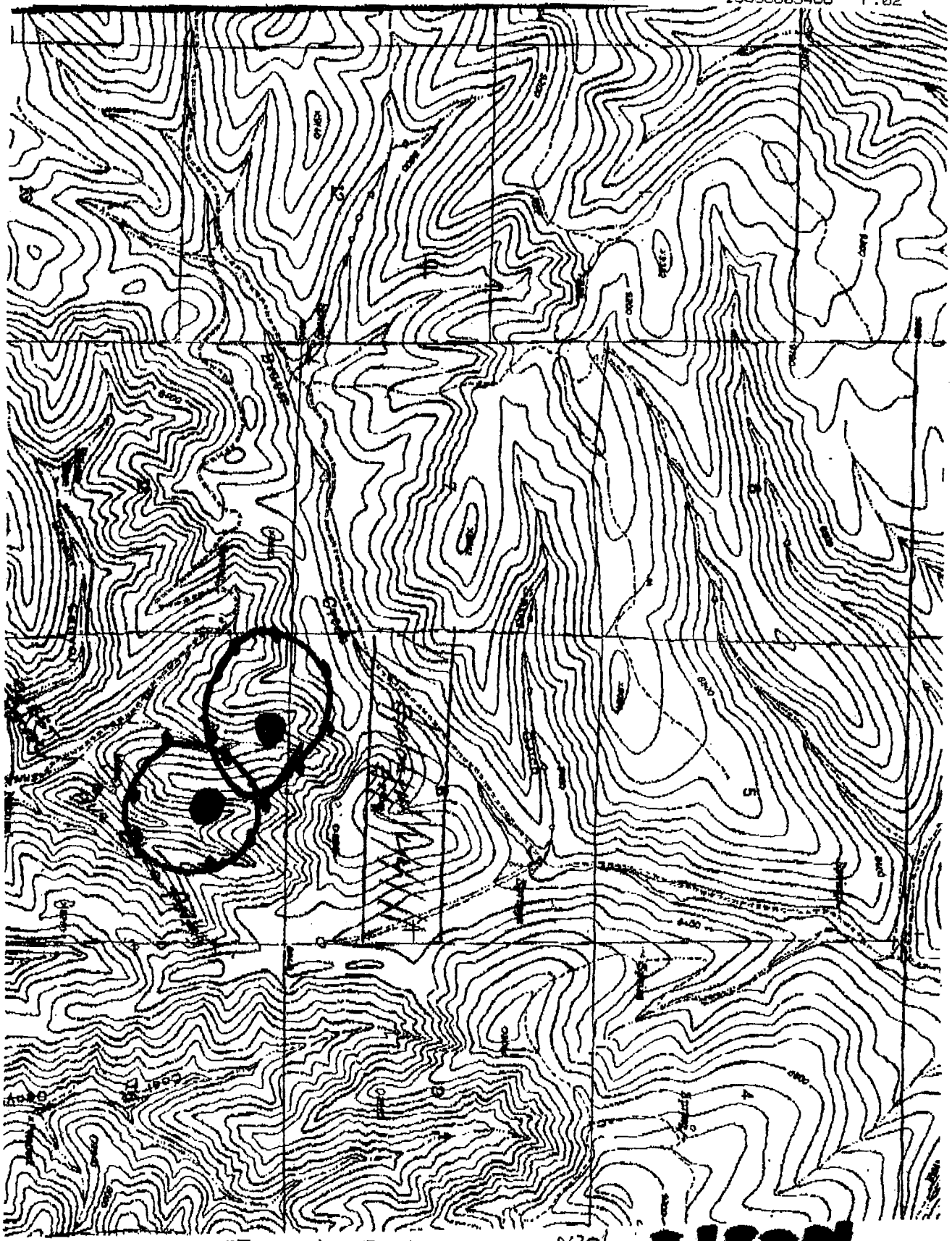
H-BE-SU — BOUNDARY (High Priority, Bald Eagle, Summer)

PERMIT AREA BOUNDARY

S-MC-YL — BOUNDARY (Substantial Value, Mnt. Cottontail, Yearlong)

S-DC-YL — BOUNDARY (Substantial Value, Desert Cottontail, Yearlong)

S-RG-YL — BOUNDARY (Substantial Value, Ruffed Grouse, Yearlong)



Bald Eagle / Prairie Falcon Nests

Poly inside white circle

# APPENDIX 10-2

# AQUATIC INFORMATION

# APPENDIX 7

## AQUATIC BASELINE STUDY

## BEAVER CREEK

SELECTED RESOURCE PARAMETERS

FOR BEAVER CREEK (CARBON COUNTY), UTAH

Beaver Creek is divided into two stream sections.

- Section 1 is located from the Price River confluence upstream to the Carbon County line. Distance equals two miles.
- Section 2 is located from the Carbon County line upstream to the headwaters. Distance equals 7.75 miles.

| Parameter | Section 1 | Section 2 |
|---|---|---|
| 1. Density of Aquatic Macroinvertebrates | | |
| - Ephemeroptera (mayflies) | 6/sq. ft. | 0.1/sq. ft. |
| - Plecoptera (stoneflies) | 2/sq. ft. | 0/sq. ft. |
| - Tricoptera (caddis flies) | 1/sq. ft. | 0.4/sq. ft. |
| - Diptera (black and crane flies) | 1/sq. ft. | 0.04/sq. ft. |
| - Mollusca (clams, snails) | 0/sq. ft. | 0.19/sq. ft. |
| - Annelida (worms, leaches) | $\angle$ 1/sq. ft. | $\angle$ 0.01/sq. ft. |
| - Coleoptera (beetles) | $\angle$ 1/sq. ft. | $\angle$ 0.01/sq. ft. |
| 2. Relative Abundance of Fishes (No. and % sampled per 0.1 mile electro-fishing run) | | |
| - Cutthroat trout | 53 - 66% | 0 - 0% |
| - Mottled sculpin | 22 - 28% | 41 - 100% |
| - Bluehead sucker | 5 - 6% | 0 - 0% |
| - Speckled dace (1953) | 12 - 36% | 0 - 0% |
| 3. Game Fish Statistics (Cutthroat trout - 1967) | | |
| - Mean total length (mm) | 125 | -- |
| - Population Estimate (Fish/mile) | at least 530 | -- |

# CHAPTER 11

# CLIMATOLOGY AND AIR QUALITY

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# CHAPTER 11

# CLIMATOLOGY AND AIR QUALITY

## 11.1 Climate

The climate can be characterized as arid, specifically dry continental. The prevailing local low-level meteorological influences are mountain-valley breeze systems. The low amount of annual precipitation is a result of the Sierra Nevada and Cascade ranges which act as natural barriers and prevent moist maritime air from the North Pacific from reaching the interior basins to the east. The Wasatch Mountains to the west of Castle Valley and the Tavaputs Plateau to the north provide a shelter from storms associated with westerly and northerly winds.

Average annual temperature for 1993 at Scofield (Skyline Mine) and Price are 37.7 and 62.1 degrees Fahrenheit, respectively. Annual precipitation averages 27.37 inches at Scofield (elevation 8710')and 10.94 at Price (elevation 5700'). At the Scofield (Skyline Mine) monitoring station northwest of the mine area, January is the coldest month (-9 degrees F.) and August the warmest (80 degrees F.).

Winters in the mine area are cold and dry with total snowfall averaging between 10 to 20 inches. The growing season ranges from 110 to 135 days.

Winds are generally light to moderate all seasons of the year. Strongest winds generally occur in the spring with moderate to strong southerly flow for several days at a time.

Relative humidity is highest during the winter and lower in the summer. Mean annual relative humidity is 55%. As a result of low annual precipitation totals, low mean annual relative humidity, high percentage of sunshine (absence of cloud cover), and moderate solar insulated intensity, evaporation rates are expected to be rather high in this plateau desert region.

## 11.2 Air Quality

Regional impacts from coal mining operations on particulate air quality is expected to be minimal due to the rapid fallout of particles with distance from the source and the existence of few mining operations in the canyon.

Particulate matter is predominantly fugitive dust, the increase in concentrations of other pollutants (such as sulfur dioxide, nitrogen oxides, carbon monoxide,and photochemical oxidants) are minimal. The primary source of fugitive dust will be surface disturbance by construction equipment and haul trucks. Control measures such as water and/or chemical stabilizers will be applied to the surface facility area to minimize dust. The conveyor and coal stockpile will be sprayed with water to control fugitive dust emissions.

Soil stockpiles will be seeded with a temporary seed mix to help protect the soil from erosion by wind and precipitation. Once the vegetation is in place dust from the stockpiles will be minimal.