

3.9 WILDLIFE, MIGRATORY BIRDS, AND FISHERIES

3.9.1 Affected Environment

3.9.1.1 Wildlife and Migratory Birds

The wildlife present in the assessment area are those species which are identified to specific habitat types. The valley bottoms have predominately greasewood (*Sarcobatus spp.*) and shadscale (*Atriplex confertifolia*) communities. The valley bottoms are normally drier sites and have numerous small mammals, lizards, reptiles, and non-game birds. The mid-elevations along alluvial fans are dominated by Wyoming big sagebrush (*Artemisia Tridentata Wyomingensis*), and bunchgrass sites. The higher elevations are a mosaic of mountain big sagebrush (*Artemisia vaseyana*), mountain mahogany (*Cercocarpus ledifolius*), low sagebrush (*Artemisia vaseana*), and bunchgrass sites with numerous mountain brush inclusions. The precipitation is normally highest at the upper elevations. Interspersions of juniper (*Juniperus occidentalis*), quaking aspen (*Populus tremula tremuloides*), and service berry (*Amelanchier spp.*) occur at special ecological sites.

Big game species of California bighorn sheep (*Ovis canadensis californica*) normally use rugged mountain tops and side slopes; desert bighorn sheep (*Ovis canadensis nelsonii*) normally use lower elevation rimrock and rock outcroppings; mule deer (*Odocoileus hemionus*) use upper elevations and mountain side slopes; and pronghorn antelope (*Antilocapra americanana*) normally use any elevations which have short vegetation. Each of these big game species have their preferred habitat; however, high snow events and wildfires each cause wildlife to move to lower elevations or to non-burned sites.

Several mammalian predators occur in the assessment area. Mountain lions (*Felis concolor*) normally prefer mountaintops and side slopes where the prey base is located. Bobcats (*Lynx rufus*) will be found in sagebrush communities and mountainside slopes. Coyotes (*Canis latrans*) may be found anywhere but are more common in sagebrush communities. Weasels (*Mustela spp.*) are found wherever small mammals are found. Gray fox (*Urocyon cinereoargenteus*) are usually found associated with pinyon pine (*Pinus edulis*)/juniper woodlands while kit fox (*Vulpes macrotis*) are found at lower elevations.

Several small mammals are common including the desert cottontail rabbit (*Sylvilagus auduboni*), blacktail jackrabbit (*Lupus californicus*), and several species of bats and ground squirrels. The assessment area also has numerous raptors, amphibians, and reptiles.

Migratory birds may be found either as seasonal residents or as migrants. Executive Order 13186, titled "Responsibilities of Federal Agencies to Protect Migratory Birds," was signed on October 1, 2001 to enhance and ensure the protection of migratory birds. All birds in the assessment area are neotropical migratory birds except for all the Gallinaceous birds (California quail, sage grouse, chukar partridge, gray partridge, ring-necked pheasant, mountain quail, and sharp-tailed grouse). Sage grouse are located throughout the assessment area, and over time have generally experienced a decline in population numbers. In August 2001, the Nevada

Governor established a Sage Grouse Conservation Team as part of the Nevada Sage Grouse Conservation Project for conserving and protecting Nevada’s sage grouse and their habitat.

3.9.1.2 Fisheries

Fishery resources within the assessment area consist of both non-game and game species (see Table 3.9-1). Large elevation changes and varying amounts of precipitation are common throughout the district, which allows for over 875 miles of lotic systems (streams) and several thousand acrea of lentic systems (springs, seeps, wet meadows, and lakes). Habits for both non-game and game species occur in both lentic and lotic systems found in the district. Although several game species thrive in northern Nevada, only one game species, the Lahontan cutthroat trout (*Oncorhynchus mykiss*), is native to the region. Other game species include: brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykss*), and brook trout (*Salvelinus confluentus*).

Game or sport fish in northern Nevada can be generally categorized as “warm water” (e.g., bass catfish, etc.) or “cold water” fish (i.e., trout). Warm water fish are most likely to occupy reservoirs, larger springs, and higher order streams on valley-floors, and cold water fish are mostly restricted to cold springs and low order, mountain streams. Table 3.9-1 categorizes warm and cold-water fish within the assessment area, and Table 3.9-2 shows aquatic habitat types that are believed to occur within each PVA/KGRA. Additional surveys are necessary to determine species and aquatic habitats that may be affected by geothermal development within each KGRA/PVA.

**TABLE 3.9-1
SPORT FISH**

Common Name	Scientific Name	Common Name	Scientific Name
Black bullhead ²	<i>Ictalurus melas</i>	Largemouth bass ²	<i>Micropterus salmoides</i>
Black crappie ²	<i>Pomoxis nigromaculatus</i>	Northern pike ²	<i>Esox lucus</i>
Bluegill ²	<i>Lepomis macrochirus</i>	Rainbow trout ¹	<i>Oncorhynchus mykiss</i>
Brook trout ¹	<i>Salvelinus confluentus</i>	Redear sunfish ²	<i>L. microlophus</i>
Brown bullhead ²	<i>Ictalurus nebulous</i>	Sacramento perch ²	<i>Archoplites interruptus</i>
Brown trout ¹	<i>Salmo trutta</i>	Smallmouth bass ²	<i>M. dolomieu</i>
Channel catfish ²	<i>Ictalurus punctatus</i>	Walleye ²	<i>Stizostedion vitreum</i>
Common carp ²	<i>Cyprinus carpio</i>	White catfish ²	<i>Ictalurus catus</i>
Green sunfish ²	<i>L. cynellus</i>	White crappie ²	<i>P. annularis</i>
Lahontan cutthroat trout ¹	<i>Oncorhynchus clarki henshawi</i>	Yellow perch ²	<i>Perca flavescens</i>

¹ Denotes cold-water fish

² Denotes warm-water fish

The U.S. Fish and Wildlife Service (USFWS) listed the Lathontan cutthroat trout as threatened in 1975 under the Endangered Species Act (ESA) of 1973.¹⁵ Its distribution is summarized in Table 3.9-2.

**TABLE 3.9-2
AQUATIC HABITAT TYPES**

PVA/KGRA	Potential Aquatic Habitat Types
1	Spring
2	Spring and stream
3	Spring
4	Spring
5	Stream
6	Stream and spring
7	River, stream, marshland, and spring
8	Spring and stream
9	River, reservoir, stream, marshland and spring
10	Spring
11	Spring and stream
12	Spring
13	Marshland and spring
Gerlach	Marshland and spring
Brady	Thermal spring
San Emidio	None
Dixie Valley	Marshland and spring

**TABLE 3.9-3
LATHONTAN CUTTHROAT TROUT
RECOVERY AREAS IN THE ASSESSMENT AREA**

Black Rock Desert Basin	
Current or Recent Existing Populations	
Summit Lake	Snow Creek
Mahogany Creek	Upper Leonard Creek
Summer Camp Creek	

¹⁵ Endangered Species Act of 1973 (P.L. 93-205 as amended (16 USC §1531 *et seq.*))

Potential Sites	
Chicken Creek	Cold Springs Creek
North Fork Battle Creek	Red Mountain Creek
Big Creek, Pine Forest Range	Raster Creek
Happy Creek	Bartlett Creek
Mary Sloan Creek	Paiute Creek
Rodeo Creek	Jackson Creek
Granite Creek	Donnelly Creek
Colman Creek	Cottonwood Creek
House Creek	Log Cabin Creek
Quinn River Basin	
Current or Recently Existing Populations	
Sage Creek	South Fork Flat Creek
Line Canyon Creek	Indian Creek
Washburn Creek	Rock Creek, Montana Range
Crowley Creek	East Fork Quinn River
Riser Creek	Rebel Creek
Eight-mile Creek	
Potential Sites	
Andorno Creek	Cottonwood Creek
McDermitt Creek	Ten Mile Creek
Flat Creek	
Humboldt River Basin	
Current or Recently Existing Populations	
South Fork Little Humboldt River	South Fork Indian Creek
Pole Creek	Able Creek
Indian Creek	North Fork Little Humboldt River
Rock Creek, Sonoma Range	

Source: *Recovery Plan for the Lahontan Cutthroat Trout, January 1995, U.S. Fish and Wildlife Service - Region 1, Portland, Oregon*

3.9.1.3 Other Biota

The assessment area could have several species of algae, bacteria, fungus, molds, yeast, invertebrates, and/or other small plants occupying warm geothermal springs and/or other surface expression.

No inventories or surveys have been completed for the assessment area to date; however, over time species surely have adapted to the geothermally-heated water ecosystem and could be important to science, biodiversity, and the existence of each species.

3.9.2 Environmental Impacts

Wildlife and Migratory Birds. Geothermal development could affect wildlife and migratory birds in a variety of direct and indirect ways. While a substantial amount of additional work is necessary to determine the distribution and demography of populations that could be affected by the proposed action, information gathered from other geothermal developments and knowledge of the environmental consequences of habitat alteration and pollutants provides sufficient information to assess potential impacts. Potential impacts are summarized below, but a more thorough analysis of how individual wildlife and migratory bird species would be affected by activities that are associated with developing each KGRA/PVA would be assessed during site-specific EAs that would be prepared for each lease.

Environmental effects of geothermal resource development are similar to other activities affecting terrestrial habitat, and surface and groundwater. While each species would respond differently to various impacts, all of them could be affected by activities that alter the thermal, physical, or chemical characteristics of their habitats. Physical habitat alteration could result from on-site facility construction, road and power line construction. Impacts of groundwater removal could affect spring and stream discharge (which could modify physical, chemical, and thermal characteristics of aquatic habitats), and alter the thermal characteristics of soils. Surface discharge of thermal waters could also affect chemical and thermal characteristics of habitats that are important to terrestrial and aquatic communities. In addition, geothermal development at various stages could disrupt big game movement corridors.

Avian species could be most affected by direct and indirect influences of power line construction, operation, and maintenance, and include constructing roads, building towers, and stringing high-tension power lines. Potential direct effects include habitat alteration and fragmentation, modification of thermal and chemical characteristics of surface waters that could affect riparian vegetation that is used for nesting and foraging, and mortality from electrocution when power lines are used for roosting. Geothermal development could adversely impact breeding, nesting, and brood-rearing habitat for sage grouse by removal of vegetation and destruction of areas during construction. Indirect effects are largely attributed to increased human activity, which could displace individuals or reduce nesting success of species that are sensitive to disturbance. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

Species associated with larger aquatic habitats (e.g., aquatic, marshland, and riparian species) could be adversely affected by increased activity in riparian systems (e.g., road construction, disturbances that increase erosion, etc.) and by changes in water quality that could be associated with surface release of geothermal water or construction materials. Spring-dwelling species could also be affected by these factors in addition to alterations in discharge and thermal characteristics that could occur with groundwater removal. Some small and immobile species could suffer direct mortality due to construction activities.

Fisheries. Fisheries resources that could be affected differ among PVAs/KGRAs, and effects of development on these resources would be assessed in site-specific EAs prepared for individual PVAs and KGRAs. Fisheries resources occupying larger aquatic habitats (e.g., streams, rivers, reservoirs, and marshlands) could be adversely affected increased activity in riparian systems (e.g., road construction, disturbances that create barriers to movement, increase erosion, sedimentation, reduce habitat heterogeneity, etc.) and by degrading water quality (thermal or chemical) or quantity. Spring-dwelling populations could be affected by these factors in addition to alterations in discharge and thermal characteristics that could occur as a result of groundwater extraction. Road construction could also increase access into areas that are currently remote, which could allow additional legal and illegal take of sport fish. Increased access could also result in unwanted introductions of non-native species into remote habitats.

Other Biota. Loss of surface expression of a hot spring could destroy populations of endemic invertebrate species. Spills, drill fluids, and well testing, could adversely impact water quality and which could be toxic. Impacts to endemic species would be minimized through avoidance and developing appropriate stipulations.

3.9.2.1 Proposed Action

Direct Impacts – There are no direct impacts to issuing leases for future geothermal exploration, development, and production activities.

Indirect Impacts – When considering the “reasonably foreseeable development scenario,” there would be minor environmental impacts concerning wildlife, migrating birds, or fisheries. Using an updated PEA as the guideline for new leases would more adequately provide the level of protection required to ensure that these biological resources are protected under current Federal and State statutes.

The following are the potential environmental impacts on wildlife, migratory birds, and fisheries when analyzing the “reasonably foreseeable development scenario.”

Exploration. The environmental impacts on wildlife, migratory birds, and fish are expected to be short-lived and restricted to small geographical areas during the geothermal energy exploration phase. Displacement of wildlife and migratory birds is not expected to make significant long-term changes to habitat or animal/bird life styles. The greatest short-term impacts would occur during traditional calving of large game animals and migratory birds nesting periods, should physical destruction of nesting sites and associated habitat occur through

the various phases of development. Other exploration impacts include drilling residue and/or extracted water being released into streams or lakes.

Development. The development phase would be very similar to the exploration phased though it would be expected to last somewhat longer and create more disruption to wildlife, migratory birds, and fish populations.

Production. During the production phase, long-term effects could occur to wildlife, migratory birds and sport fish depending on where the permanent facilities are located and electrical power transmission lines are built. Production would cause greater long-term impacts to big game habitat and corridors. With production lasting up to several decades, these effects would be long lasting; however they would be restricted to small geographical areas. It is expected that wildlife would quickly adjust to the commercial development and be able to cohabitate with minimum disruption to wildlife life styles.

Close-Out. Close-out of a developed geothermal production operation could cause short-term changes to wildlife and migratory bird activity due to increased dismantling activity and noise. Once the commercial activity has been closed-out and returned to its original, natural configuration, wildlife and migratory bird rehabilitation is expected to occur over a very short period of time. This would depend on the speed of regrowth of cover and forage.

3.9.2.2 No Action Alternative

Direct Impacts – There are no direct impacts to issuing leases for future geothermal exploration, development, and production activities.

Indirect Impacts – Indirect impacts from the No Action Alternative would be similar to those described in the Proposed Action; however, updated mitigation measures and stipulations would not apply using the 1982 Geothermal EA.