BLM

Elko District, Nevada

ENVIRONMENTAL ASSESSMENT

2008 Geothermal Lease Sale

Boart Longyear Company's Drill Rig on Site of Hot Sulphur Springs Geothermal Project
Elko County, Nevada

June 2008

3200 (BLM/EK/PL-2008/012)

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Cover Photo by Colin Goranson, T G Power LLC, Well 87-5
Boart Longyear Company's HD602 Drill, operated out of Salt Lake City UT and Elko NV

2008 GEOTHERMAL LEASE SALE
Environmental Assessment

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1 - INTRODUCTION

The Bureau of Land Management (BLM) is considering leasing ten parcels, comprising about 30,612 acres of land in northeastern Nevada within the area administered by the Elko District Office. See **Map 1** (attached). The parcels have been nominated by industry. The Elko District encompasses about 11 million acres, of which approximately 7.2 million acres are public lands managed by the BLM.

The BLM, Elko District Office, has prepared this environmental assessment (EA) to comply with the National Environmental Policy Act of 1969 (NEPA). Leasing of lands for the development of geothermal resources was previously analyzed in environmental impact statements (EISs) for the 1987 Elko Resource Management Plan and the 1985 Wells Resource Management Plan (RMPs). This EA address any new circumstances or information bearing on the environmental consequences of leasing that was not considered within the broad scope analyzed for the RMPs.

Background

For decades, domestic production of energy in America has not kept pace with increasing consumption. Imported oil supply and prices are subject to world-wide political and social changes such as war and terrorism. These unpredictable events put the American economy and the security and welfare of the American citizens at risk in the form of disruption of energy supplies and drastically increased prices. Recognizing the increasing risk, President George W. Bush signed Executive Order 133212 on May 18, 2001, and Congress passed the Energy Policy Act of 2005, with the intent of increasing the domestic supply of energy from oil, gas and geothermal resources.

1.1 PURPOSE AND NEED

The need for the leasing of public mineral estate (geothermal leasing) is to provide for timely exploration and development of energy resources on public lands, thus reducing U.S. dependence on imported supplies. Parcels of public and private lands (mineral estate) are open to leasing to encourage development of geothermal resources.

The Energy Policy Act of 2005 (Public Law 109-58) identifies the need for greater energy security and is directed towards a reduced dependence on foreign energy sources. It provides Production Tax Credits to encourage the development of alternative energy, and it also emphasizes the need to upgrade the energy infrastructure by upgrading and modernizing the energy grid to meet the needs of a growing economy and population. The Advanced Energy Initiative, derived from the Act, is directed towards increasing the generation and use of alternative fuels and clean energy technology, including solar, wind, and geothermal energy sources.

The purpose of this action is to lease and facilitate development of geothermal resources where appropriate, consistent with the Energy Act of 2005 and related policies, and in a manner that will promote use of clean technology and prevent undue degradation of public resources and uses.

As public mineral estate is leased for development of geothermal resources, BLM determines stipulations which are attached to the lease for a given parcel to avoid or minimize impacts on resources such as wildlife, wilderness, and cultural resources. Stipulations are written to conform to approved land use plans governing BLM's management of resources in the area to be leased, and to be consistent with laws, regulations, policies, rules, and orders.

Leasing is authorized under the Geothermal Steam Act of 1970, as amended and modified by subsequent legislation, and regulations found at 43 CFR part 3200. Geothermal leasing is recognized as an acceptable use of the public lands under the Federal Land Policy and Management Act of 1976 (FLPMA). BLM authority for leasing public mineral estate for the development of geothermal resources is listed in 43 CFR 3200.1.

1.2 LAND USE PLAN CONFORMANCE

FLPMA directs the BLM to develop and maintain comprehensive Resource Management Plans (RMPs) that govern all aspects of public land management, and that proposed leasing activities conform to approved RMPs. Leasing of lands within the Elko District for the production of energy resources is managed in accordance with direction provided the Wells RMP as approved June 28, 1985, and the Elko RMP, approved March 11, 1987. Maintenance of a RMP is a routine action as it is implemented. Since approved, both RMPs have been periodically evaluated and amended as necessary to address current policies and emerging issues. Parcels nominated for leasing are screened to identify areas open to leasing and applicable lease stipulations.

The 1985 Record of Decision (ROD) for the Wells RMP, page 25, provides that, "The public lands will be managed in a manner which recognizes the Nation's needs for domestic sources of minerals." As a standard operating procedure (SOP) pertinent to establishing special stipulations to attach to leases, the ROD prescribes that, "*Time-of-day and/or time-of-year restrictions will be placed on construction activities associated with leasable and saleable mineral explorations and/or development that are in the immediate vicinity or would cross crucial sage grouse, crucial deer and pronghorn antelope winter habitats, antelope kidding areas, or raptor nesting areas.*"

The 1987 Elko RMP determined whether or not areas of land are subject to mineral leasing as follows (ROD, page 4 and Map 13):

(1) <u>Open – subject to standard leasing stipulations</u> (82 percent of the RMP area)

(2) <u>Limited – subject to no surface occupancy</u> (Special Recreation Managements Areas and sage grouse strutting grounds)

(3) <u>Limited – subject to seasonal restrictions</u> (crucial deer winter range, crucial antelope yearlong habitat and sage grouse brood rearing areas).

(4) <u>Closed</u> – (wilderness and wilderness study areas recommended for designation).

The Wells and Elko RMPs close all Wilderness Study Areas (WSAs) to leasing, and state that WSAs will be managed under the Bureau's Interim Management Policy for Lands Under Wilderness Review (IMP). No new leases can be issued on lands under wilderness review according to the IMP (H-8550-1, Rel. 8-67, 1995, page 32). The WSAs in the Wells RMP planning area include the Bluebell, Goshute Peak, South Pequop and Bad Lands WSAs (1985 Wells ROD; page 16 and Map 4). WSAs in the Elko planning are the Rough Hills, Little Humboldt River, Cedar Ridge and Red Spring, and Owyhee Canyonlands WSAs (1987 Elko

ROD; page18, Map 7 and page 37). The nominated parcels have been screened to ensure the proposed sale does not include lands in a WSA.

1.3 RELATIONSHIP TO OTHER LAWS, POLICIES AND PLANS

The proposed action and alternatives, as described in the next chapter, is consistent with Federal, State and local laws, regulations, policies and plans to the maximum extent possible, including:

- Geothermal Steam Act of 1970, as amended and supplemented by subsequent legislation
- Federal Land Policy and Management Act of 1976, which calls for managing the public lands for multiple use
- 43 CFR Part 3200, which provides regulations governing geothermal leasing
- Executive Order 133212, which directs the Secretary of the Interior to expedite energy-related projects
- Energy Policy Act of 2005, which is directed towards a reduced dependence on foreign energy sources and encourages the development of alternative energy
- National Historic Preservation Act (NHPA) and rules for implementing section 106 found at 36 CFR Part 800
- Endangered Species Act (ESA) and rules for implementation of section 7 found at 50 CFR Part 402
- Humboldt Toiyabe National Forest Land and Resource Management Plan
- State of Nevada mandates to increase the generation and transmission of sustainable energy produced by low emission processes by 2013
- State of Nevada statutes and plans governing management of wildlife and water resources
- Land use policy plans for Elko County, Eureka and Lander counties

2 – ALTERNATIVES

This chapter describes alternatives for the leasing of geothermal resources in the Elko District. The Proposed Action is for the Nevada State Director to offer all of the currently nominated parcels that are administered by the Elko District in a competitive geothermal lease sale to be held in August of 2008. Alternatives to the proposed action are examined to insure that consideration is made of all practicable methods to mitigate impacts from future activities related to the proposed leasing action. The alternative to Defer Leasing, of two of the ten parcels, is considered (and preferred by the Elko District). Lands leased would then be available for exploration and development of geothermal resources for a 10-year period, subject to stipulations attached to the lease for a given parcel. Under the No Action alternative, no Elko District parcels would be offered in the statewide sale. This chapter concludes with a description of other alternatives for modifying, removing or deferring leasing of all of the nominated parcels, and the reasons why the alternative was eliminated from detailed analysis in chapter 3 of this EA.

2.1 OFFER NOMINATED PARCELS FOR LEASE (PROPOSED ACTION)

The proposed action is to lease parcels of federal mineral estate that have been nominated by industry and which have been determined to be open to leasing, subject to standard lease terms and applicable special stipulations. The tracts of federal mineral estate to be offered may lie under surface administered by the BLM, or under split estate, i.e., surface owned or administered by an individual or non-federal government agency.

This EA specifically covers ten proposed geothermal leases in the Elko District. The ten parcels total approximately 30,612 acres and are shown on **Map 1**. The State Director's sale notice would provide legal description of the proposed lease parcels, as listed below.

Table 2-1: 2008 Lease Sale Legal Descriptions for Elko District Parcels

Parcel Number	Township, Range	Sections (21 MDM NV)	Acres
NV-08-07-065	**T. 310N, R. 48 E**		**1,267.830**
		004 LOTS 1-4;	
		004 S2N2, S2;	
		010 LOTS 1-7;	
		010 S2NE, SENW, E2SW, SE	
NV-08-07-069	**T. 310N, R.59 E**		**2,240.000**
		013 ALL;	
		024 ALL;	
		025 ALL;	
		036 N2	
NV-08-07-070			**2,084.98**
	T. 38 N, R. 59 E		
		002 LOTS 4;	
		002 SWNW, W2SW;	
		004 LOTS 1-4;	
		004 S2N2, S2;	
	T. 39 N, R. 59 E,		
		034 ALL;	
		036 ALL;	
NV-08-07-071	**T.38 N, R.59 E**		**2,040.00**

Parcel Number	Township, Range	Sections (21 MDM NV)	Acres
		010 ALL;	
		011 W2W2;	
		012 E2, E2W2;	
		014 SWNW, W2SW;	
		016 ALL	
NV-08-07-072	**T. 38 N, R. 59 E**		**1,271.850**
		022 ALL;	
		024 E2;	
		026 LOTS 2-6;	
		026 E2NENE;	
		036 E2NE;	
NV-08-07-073	**T. 390N, R. 59 E**		**1,840.000**
		013 E2E2E2;	
		014 ALL;	
		022 NWNW, S2N2, S2;	
		024 NWNE, NW, N2SW;	
		026 N2N2, S2NW, W2SW;	
NV-08-07-074			**5,095.640**
	T. 29 N, R. 61 E		
		001 LOTS 1-4;	
		001 S2N2, S2;	
		012 ALL;	
		013 ALL;	
	T. 29 N, R. 62 E		
		015 ALL;	
		016 ALL;	
		017 ALL;	
		018 LOTS 1-4;	
		018 E2, E2W2;	
		019 LOTS 1-4;	
		019 E2, E2W2;	
NV-08-07-075	**T. 29 N, R. 61 E**		**5,071.780**
		017 ALL;	
		018 LOTS 1-4;	
		018 E2, E2W2;	
		019 LOTS 1-4;	
		019 E2, E2W2;	
		020 ALL;	
		005 LOTS 1-4;	
		005 S2N2, S2;	
		006 LOTS 1-7;	
		006 S2NE, SENW, E2SW, SE;	
		007 LOTS 1-4;	
		007 E2, E2W2;	
		008 ALL;	
NV-08-07-076	**T. 29 N, R.62 E**		**4,609.360**
		001 LOTS 1-4;	
		001 S2N2, S2;	
		002 LOTS 1-4;	
		002 S2N2, S2;	
		011 ALL;	
		012 ALL;	
		013 ALL;	
		014 N2, N2S2, SWSW, SESE;	

Parcel Number	Township, Range	Sections (21 MDM NV)	Acres
		014 N2SESW, W2SWSESW, N2SWSE;	
		014 NESWSWSE, SESWSE;	
		023 E2SENE, E2W2SENE, SWSWSENE;	
		023 NENE, SWNW, SESE;	
		024 ALL	
NV-08-07-077	**T. 29 N, R. 62 E**		**5,090.280**
		003 LOTS 1-4;	
		003 S2N2, S2;	
		004 LOTS 1-4;	
		004 S2N2,S2;	
		005 LOTS 1-4;	
		005 S2N2, S2;	
		006 LOTS 1-7;	
		006 S2NE, SENW, E2SW, SE;	
		007 LOTS 1-4;	
		007 E2, E2W2;	
		008 ALL;	
		009 ALL;	
		010 ALL;	

As described in section 2.1.2, the Elko District Office has also determined special stipulations to attach to each lease to protect resources. These stipulations are described in section 2.1.1, and the standardized text for each stipulation is in **Appendix B**. Also described in section 2.1.2 are lease notices to advise potential lessees of additional resource concerns, to the extent practical at the initial leasing stage.

2.1.1 Resource Protection Lease Terms and Stipulations

Standard Lease Terms -- The standard lease form for fluid minerals grants a lessee the right to explore for and develop the resource, subject to standard lease terms pertaining to the conduct of operations. The conduct of operations by the lessee would be subject to the following:

> **Conduct of Operations** (SF-3100-11, Section 6)
> Lessee shall conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological and other resources, and to uses or users. Lessee shall take reasonable measures deemed necessary by the lessor to accomplish the intent of this section. To the extent consistent with lease rights granted, such measures will include, but not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in leased lands, including the approval of easements or right-of-way. Such uses shall be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee.
>
> Prior to disturbing the surface of the leased lands, lessee shall contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that will be necessary. Areas to be disturbed would require inventories or special studies to determine the extent of impacts to other resources. Lessee would be required to complete minor inventories or short-

> term special studies under guidelines provided by lessor. If in the conduct of operations, threatened or endangered species, objects of historic or scientific interest or substantial unanticipated environmental effects are observed, lessee shall immediately contact lessor. Lessee shall cease any operations that would result in destruction of such species or objects.

Special Stipulations -- The Elko District Office has identified special resource protection stipulations to conform to approved land use plans and ensure post-leasing activities comply with pertinent laws and policies. A summary of the stipulations that could be assigned to each lease follows. The full text of each stipulation is in **Appendix B**.

Cultural Resources/Native American Consultation (OG-010-05-03) – This stipulation is included in all leases to advise the potential lessee that BLM will not approve any ground disturbing activities that would affect a cultural property until it completes its obligations under applicable requirements of the National Historic Preservation Act (NHPA) and other authorities (WO IM 2005-003).

> This lease would be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

Threatened, Endangered and Sensitive Species (OG-010-05-01) **–** This stipulation is attached to all leases. It informs the lessee that the BLM would take whatever steps are necessary to comply with law and policy to protect special status species. Activities that could adversely affect threatened, endangered, or sensitive species habitat will not be permitted. Actions in threatened, endangered, or sensitive species habitat will be designed to benefit these species through habitat. All project work will require a threatened, endangered, or sensitive species clearance before implementation. Consultation with the U.S. Fish and Wildlife Service per section 7 of the Endangered Species Act is necessary if a threatened, endangered, or proposed threatened or endangered species, or its habitat may be affected. Other species considered sensitive, but not under the protection of the Act, are given special management considerations through BLM policy. If adverse impacts to special status species are identified during project planning, the project will be modified or possibly abandoned to avoid these impacts (Elko ROD, p. 39; WO IM 2002-174).

Raptor Nesting Sites (OG-010-05-02) -- This stipulation is attached to all parcels to permit establishing a buffer zone of no activity around nesting sites during nesting seasons. (Wells RMP ROD p. 25; Elko RMP ROD p. 25)

Mule Deer Crucial Winter Range (OG-010-05-04) -- This stipulation prevents disturbances in crucial winter range during the winter season. (Wells RMP ROD p. 10; Elko RMP ROD p.3)

Pronghorn Antelope Crucial Winter Range (OG-010-05-05) -- This stipulation prevents disturbances in crucial winter range during the winter season. (1985 Wells RMP ROD p. 25; 1987 Elko RMP ROD p.3)

Pronghorn Antelope Kidding Areas (OG-010-05-06) – This stipulation prevents disturbance in kidding areas during the kidding season of May 1 to June 30. (Elko RMP FEIS p. 2-6)

Sage Grouse Strutting Grounds (OG-010-05-07) – This stipulation prevents use of the surface within ½ mile of known strutting grounds (leks). (Wells RMP ROD p. 10; Elko RMP ROD p. 35)

Sage Grouse Brood Rearing Areas (OG-010-05-08) – This stipulation prevents disturbance within ½ mile of brood rearing areas between May 15 and August 15. (Wells RMP ROD p. 25; Elko RMP ROD p.3)

Sage Grouse Crucial Winter Habitat (OG-010-05-09) – This stipulation prevents disturbance on lands identified as crucial habitat between November 1 and March 15.

I-80 Low Visibility Corridor (OG-010-05-10) – This stipulation limits visual impacts within 1.5 miles of either side of Interstate 80 as it crosses the Elko District, with the goal of retaining the existing character of the landscape. (Wells RMP ROD p. 3; Elko RMP ROD p. 1)

Special Recreation Management Areas (SRMAs) (OG-010-05-011) – This stipulation restricts surface occupancy within specified parts of the SRMAs at South Fork Canyon, Wild Horse, Wilson Reservoir, South Fork Owyhee River, Zunino/Jiggs, and the proposed Salmon Falls Creek. (Wells RMP ROD p. 25; Elko RMP ROD p. 3)

Tabor Creek Campground (OG-010-05-12) – This stipulation restricts surface occupancy within the Tabor Creek Campground. (Wells RMP ROD p. 25)

No Surface Occupancy (NSO-010-64-13) – This stipulation restricts surface occupancy within areas specifically identified.

Based on screening of the currently nominated parcels, **Table 2-2** identifies the special stipulations that would be attached to each lease.

The stipulations for cultural resources and Native American consultation, raptor nests, and threatened, endangered and sensitive species would be attached to <u>all</u> leases.

Stipulations that restrict surface occupancy or impose seasonal restrictions on post-leasing activities have been applied to parcels where necessary to protect wildlife resources.

None of the areas encompass special recreation management areas.

Specific areas where the No Surface Occupancy restriction to protect traditional cultural properties could not be identified in the timeframe for this analysis, but could be applicable to two of the currently nominated parcels (Parcel 65 near Beowawe and Parcel 69 in Ruby Valley).

Table 2-2: Special Resource Protection Lease Stipulations by Parcel No.

Stipulation No.	Resource	65	69	70	71	72	73	74	75	76	77
OG-010-05-01	Threatened, Endangered & Sensitive Species	X	X	X	X	X	X	X	X	X	X
OG-010-05-02	Raptor Nests	X	X	X	X	X	X	X	X	X	X
OG-010-05-03	Cultural Resources/Native American Consultation	X*	X*	X	X	X	X	X	X	X	X
OG-010-05-04	Crucial Mule Deer Winter Range										
OG-010-05-05	Antelope Winter Range	X		X	X	X			X		
OG-010-05-06	Antelope Kidding Area										
OG-010-05-07	Sage Grouse Leks				X		X				
OG-010-05-08	Sage Grouse Brood Area		X	X	X	X	X	X			
OG-010-05-09	Sage Grouse Crucial Winter Habitat		X						X		
OG-010-05-10	I-80 Low Visibility Corridor										
OG-010-05-11	Special Recreation Mgmt Area										
OG-010-05-12	Tabor Creek Campground										
OG-010-05-13	Historic Trails		*								
NSO-010-64	No Surface Occupancy	*	*								

*Ethnographic studies are underway that affect the Elko District's determination for these stipulations

2.1.2 Lease Notices

Other "Lease Notices" are to advise the potential lessee of additional resource concerns, to the extent practical at the initial leasing stage. Such concerns would be more specifically addressed when and if a lessee proposes surface disturbance, through Standard Operating Procedures, Best Management Practices, and imposition of applicable laws, regulations consistent with the standard lease terms and special stipulations. They include:

Native American Monitor - This lease notice reserves the right for BLM to require that a designated representative of the Western Shoshone be allowed on site as a condition of approving any ground disturbing activities conducted on leased lands.

Pygmy Rabbit – This notice is to advise the lessee that the leased lands may provide habitat for pygmy rabbit, a sensitive species for which conservation measures may be required.

Mule Deer Crucial Summer Range and/or Migration Corridor – This notice advises the lessee of habitat of importance to the management of mule deer.

The following identifies other concerns noted by specialists that a lessee should be aware of:

Table 2-2: **Potential Resource Protection Lease Notices by Parcel No.**

Resource	65	69	70	71	72	73	74	75	76	77
Native American Monitor	*	*								
Pygmy Rabbit		X								
Mule Deer Crucial Summer			X	X	X	X				
Mule Deer Migration Corridor							X			

*Ethnographic studies are underway that affect the Elko District's determination for this notice

2.2 REMOVE OR DEFER OFFERING CERTAIN PARCEL(S) FOR LEASE

Current BLM policy makes the State Director responsible for notifying those who submitted the expression of interest for any tracts not leased, or deferred for leasing. The letter must state the reasons for not offering the parcel(s), and the factors considered in reaching that decision. When deferred, BLM must give an approximate date when analysis of new information bearing on the leasing decision is anticipated to be complete and when a decision to lease is expected to be made. (BLM, Washington Office, Instruction Memorandum No. 2004-110 dated 2/26/2004).

Under this alternative, a decision to offer Elko District parcels **NV-08-07-065** (1,268 acres near Beowawe) and **NV-08-07-069** (2,240 acres in Ruby Valley) would be deferred until ethnographic studies are completed and impacts to culturally significant locations can be fully analyzed. This would allow the Elko District to consult with affected tribes and the Nevada State Historic Preservation Officer to determine measures needed to mitigate adverse impacts to sensitive resources. Such measures would likely involve attaching a No Surface Occupancy stipulation and/or Native American Monitor notice to the lease. The other eight proposed parcels would be offered in the August 2008 lease sale, with the stipulations and notices as indicated in Table 2-2 and 2-3. The leases offered would total about 27,105 acres.

2.3 DO NOT OFFER LEASES (NO ACTION)

Under this alternative it would be recommended that none of the proposed leases be issued. This alternative would not allow for exploration or development of geothermal resources and would reduce the amount of domestic energy resources available to meet current demands. Not offering nominated parcels open to leasing would be contrary to the Wells and Elko RMPs, and would require an Environmental Impact Statement (EIS) or EA to revise or amend these land use plans.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

2.4.1 Lease w/ Acreage Exclusions or No Surface Occupancy Limitations

For eight of the ten nominated parcels, no issues were identified during scoping that could not be mitigated through best management practices and resource protection stipulations, including No Surface Occupancy stipulations in specifically identified areas. Leasing all or portions of the nominated parcels after excluding portions within ¼ miles of a WSA was considered. As described in the land use plan conformance statement in this EA (section 1.2), all wilderness areas and wilderness study areas are closed to geothermal leasing. This includes the following WSAs within the planning areas of the 1987 Elko and 1985 Wells RMPs:

- Wells RMP -- Bluebell, Goshute Peak, South Pequop and Bad Lands WSAs
- Elko RMP – Owyhee Canyonlands, Rough Hills, Little Humboldt River, Cedar Ridge and Red Spring WSAs.

In closing these WSAs to leasing, the approved RMPs applied land management prescriptions consistent with BLM Manual Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review. Nevada BLM policy dated September 24, 2004 (IM No. NV-2004-093) is to offer and issue fluid mineral leases to within one quarter mile of a Wilderness or WSA boundary, and exclude any quarter-quarter sections intersected by and including a portion of a Wilderness or WSA boundary. In accordance with this policy, the Elko District reviewed the currently nominated parcels, and determined none of the proposed leases are located within ¼ mile of a WSA boundary. Therefore, no acreage exclusions are necessary for the lease parcels. The Wells and Elko RMPs similarly close incorporated areas to leasing, and provide for leasing activities to be limited in special recreation management areas (SRMAs). Review of the currently nominated parcels determined they do not include such areas.

The alternative to defer leasing of parcel # NV-08-07-065 and -069, as described in section 2.2 of this EA, would allow for future development and consideration of a No Surface Occupancy stipulation where deemed necessary to protect potentially sensitive cultural areas.

Due to the determination that none of the parcels are located near areas where existing decisions would require exclusions or limit surface occupancy, together with consideration of the alternative to defer leasing of two parcels pending further analysis to determine measures for protecting sensitive cultural resources, this alternative was eliminated from detailed analysis.

2.4.2 Defer Leasing of all Parcels until an EIS is Completed

This alternative is related to the No Action alternative, and was considered due to public comments. BLM's decisions to open lands to geothermal leasing was made based on EISs for the 1985 Wells and 1987 Elko RMPs. The RMPs are currently scheduled for revision beginning in 2011. The EIS and RMP revision process would address multiple issues, and take up to 3 years. Preparation of nationwide Programmatic Geothermal Leasing EIS is currently underway, and it may amend RMPs throughout BLM. Waiting to lease currently nominated parcels until these EISs are completed would fail to meet the Nation's energy needs. No issues for significant impacts were identified during scoping and preparation of this EA that could not be mitigated. BLM determined that deferring the leasing of all the parcels until a new EIS is completed is not warranted.

3 - AFFECTED ENVIRONMENT/ENVIRONMENTAL EFFECTS

General Setting

The Elko District is typical of the Great Basin in northern Nevada. The land is characterized by north-south oriented fault block mountain ranges separated by broad, flat valleys. The climate land is arid with precipitation generally less than 10 inches per year except for the higher elevations where precipitation is higher. The vegetation is typically sagebrush/grassland and juniper or pinion/juniper woodlands. Elevations range from above 13,000 feet in the Ruby Mountains to approximately 4,200 feet along the Utah border south of Wendover. The total population within the boundaries of the district is roughly 45,000 with the great majority, more than 30,000, in the Elko/Spring Creek area. Of the 12.5 million acres within the boundaries of the Elko District, approximately 7.2 million acres are public land managed by the Elko District.

With the exception of wilderness study areas, incorporated cities, and non-federal lands where mineral rights are not reserved to the U.S., most of the 7.2 million acres of public lands and 3.8 million acres of split estate land within the boundaries of the Elko District are open to leasing. Activities in sensitive areas are subject to surface occupancy limitations or seasonal restrictions that affect the conduct of leasing operations. The proposed geothermal leases are scattered throughout the district (**Map 1)** and are subject to special stipulations where applicable.

See **Appendix A (Reasonably Foreseeable Development Scenario),** for an updated projection of post-leasing related activities throughout the Elko District. Currently there are no geothermal facilities producing electricity in the Elko District. Ten geothermal wells have been drilled on public land within the Elko District since 1990. At this time there are 13 known geothermal wells in use within the Elko District; most are located on private surface. Use of three wells of these wells that belong to the Elko County School District and Northeastern Nevada Regional Hospital is for heating public facilities including a public swimming pool, the convention center and other buildings. Another example is the well that the Elko Heat Company uses to provide heat and hot water to 20 businesses and homes in the city of Elko, including a recently completed expansion project that provides heat to a new industrial park in Elko.

Geothermal Industrial Park in Elko, Nevada (Photo by James Lindsay)

The Beowawe Power Plant is the only development for producing electricity that has been developed in the vicinity of the Elko District, and it is reasonably foreseeable that it could be expanded. Recent federal and state laws and policies encourage the development of alternative domestic energy sources to reduce consumption of non-renewable fossil fuels. T G Power LLC is currently obtaining permits to develop the 32 net megawatt Hot Sulphur Spring Geothermal Power Plant on private land in the northern portion of Independence Valley **(Cover Photo)**. Current development of the project includes construction of a 24.5 mile transmission line to deliver electricity produced by the new power plant to an existing power switching station. In December 2007, BLM received a notice for geophysical exploration on leased lands (Serial Nos. N-74915, N-731651, N-74916). In March 21, 2008, BLM issued a decision to grant a right-of-way for the transmission line (2800, N-83202). Thus, it is reasonable to also assume the Hot Sulphur Springs Power Plant could be expanded to produce additional electricity.

The effect of post-leasing activities such as geophysical exploration and development of wells, on affected resources are analyzed in section 3.2 of this chapter. These impacts, when added to the effects of other past, present and reasonably foreseeable future actions, have the potential to cumulatively affect resources and uses. Other activities include those related to livestock grazing, recreation, fire, urban development, mining and other energy related development (oil and gas, wind) activities. The existing conditions of leased lands are reflective of adverse effects associated with past uses and natural events such as wildfire and drought. Great Basin Restoration Initiative, grazing permit renewals, stream/riparian and upland restoration projects and burned area rehabilitation projects are examples of past and ongoing actions that are proposed to improve rangeland health of public lands throughout the Elko District. The cumulative impacts from other activities are summarized in section 3.3 of this chapter.

3.1 CRITICAL ELEMENTS NOT AFFECTED

The following critical elements of the human environment are not present or affected by the proposed leasing action.

- Areas of Critical Environmental Concern (Salt Lake ACEC)
- Farm Lands (Prime or Unique)
- Environmental Justice
- Hazardous or Solid Wastes
- Wild and Scenic Rivers
- Wilderness and Wilderness Study Areas

3.2. EFFECTS OF THE ALTERNATIVES

Resources present and brought forward for analysis are discussed by the following subsections. In many cases, cumulative impacts are related to assumptions for the "**Reasonably Foreseeable Development Scenario**" that may occur once the parcels are leased (see **Appendix A**).

3.2.1 Geology

Existing Conditions

Because of the potential for geothermal resources, as estimated by United States Geological Survey, public lands and mineral estate within the Elko District have been available for geothermal leasing for decades. Of the fourteen known geothermal wells currently in use within the Elko District, three belong to the Elko County School District and are used to heat public buildings. None of the wells are currently being used for electrical generation.

Effects of Leasing Activities

Geothermal energy is a nonrenewable resource. It is possible to extract energy from geothermal heated fluids and to pump the fluids back into the geothermal system (aquifer) to reuse the fluids over an extended period of time but the total amount of energy accessible is finite. Discovery and production includes the potential for release of noxious gases (Layton, et al, 1984) but there is no history of such in the Elko District; thus there is no expectation, and standard safety drilling requirements are expected to reduce any potential for negative effects to near zero. Leasing activities, including exploration and development generates geologic information that enables geologists and engineers to expand the knowledge base for geology.

If the Elko District was to experience another peak in geothermal exploration, the Reasonably Foreseeable Development scenario predicts that we could expect 74.4 acres of service roads, 17.4 acres of main roads, 12 acres disturbed for a power plant, 19.7 acres disturbed for pipelines and 3 acres disturbed for gravel pits. This totals 126.5 acres of disturbance in the foreseeable future. Most of the disturbance would be reclaimed within 1 year.

3.2.2 Socio-Economics

Existing Conditions

Geothermal energy and oil and gas are national issues as well as local issues. Elko County, with a US Census estimated population of 44,094 in 2003, relies on the exploration and development of natural resources, primarily gold, to provide the basis for employment and economic activity in the county and adjacent areas which comprise the Elko District of the BLM. Natural resource jobs, including mining, pay well, resulting in Elko County having the second highest median household income in Nevada at just over $48,000 per year. Thus the exploitation of geothermal resources benefits both the local and national economy.

The BLM leases public land, for geothermal exploration and development and supervises operations of the leases for development and production. Currently there are no geothermal production facilities located on public land in the Elko District.

Effects of Leasing Activities

Leasing, exploration, and development of geothermal resources generate revenue to the Federal, State, and local governments. The proposed action also generates economic activity in the

private sector. People and equipment are required to explore for geothermal resources. This means capital investment as well as the purchase of operational supplies such as lubricating oils and drill bits for drill rigs. Employees are required for the many disparate aspects of leasing and exploration, from those who handle permitting and land ownership issues, to those who handle the financing and payroll, to the regulatory agency employees who regulate such activities, to the on-the-ground employees who actually perform the exploration work, to the geologists who interpret the information received and advise on future exploration work.

Leasing activities also generate economically valuable information. Exploration generates information about the geology and geothermal resources at a particular location. That information could usually be used to infer geology and geothermal resources in a much wider area. The more information available, the greater the efficiency of future searches for mineral deposits of all kinds, not just geothermal resources.

Geothermal production from federal lands results in a 10-15%-of-production royalty payment to the federal government. The federal government also receives a rent of 1 to 2 dollars per acre per year for the entire lease acreage on noncompetitive leases. In addition the Federal Government receives 5% on demineralized water royalties and 5% of byproduct royalties.

Fifty percent of that amount is provided to the state government. Taxes are paid to government in a variety of forms including income and property taxes by both the geothermal production operators and the employees thereof. On the flip side, government would be providing additional services such as new roads, and road maintenance which results from geothermal development operations. The additional economic activity and employment results in a trickle down effect, supporting employment and economic activity in other sectors of the economy including housing, retail, services, and government.

A second benefit of development and production of geothermal resources is increased availability and lower prices for energy based on the supply/demand theory of economics. Lower prices mean increased economic activity along with the impact of diverting payments from a foreign nation to the internal US economy. Increased US energy supply also increases economic stability by decreasing the risks associated with importing energy, particularly oil and gas, from unstable source countries. Another benefit is that increased energy production helps to create the infrastructure such as roads, power lines, service companies, housing, and the like which support the expansion of other economic activities indirectly (rather than directly) through the need of the energy industry for employees and services.

The downside of economic expansion is increased population and increased pressure on finite resources such as water, recreation, open space, and additional demands on government services.

3.2.3 Cultural Resources

Existing Conditions

The Elko District lies in the north-central Great Basin and has been inhabited by people for around 12,000 years. Approximately 15% of the Elko District has been inventoried for cultural resources and 15,000 archaeological and historic sites have been recorded to date. Archaeological and ethnographic evidence indicate that the prehistoric inhabitants of the region were mobile hunter-gatherers who normally lived in small groups. Population density was very low among the first inhabitants but increased over time resulting in people becoming less mobile

and occupying smaller territories. Because dwellings were usually temporary and constructed of perishable materials prehistoric architectural remains are rare and the typical site consists of low visibility artifact scatters. Among the recorded prehistoric site types are: habitation sites, resource processing locations, cache locations, game drives and ambush locations, tool manufacturing locations, tool stone procurement locations, religious sites, and rock art localities. The Elko District also contains abundant evidence of historic-era sites including traces of the California Emigrant Trail, the first transcontinental railroad grade, as well as the remains of mining camps/towns, railroad towns, ranches, farms, sheep camps, Native American camps/villages, mines, roads, utility lines, wood-cutter camps, refuse scatters, aspen art, horse traps etc.

Previous cultural resource inventory within the proposed ten lease parcels vary from none to limited block survey. None have been fully inventoried and most have had little inventory. Both historic and prehistoric cultural resources have been recorded. Estimated or actual site density ranges from low to high. The potential for finding more prehistoric sites in close proximity to hot springs is high given that these resources have/had both secular and religious value to many of Nevada's indigenous people.

As noted in chapter 2, all leases would include the following stipulation to protect cultural resources, including traditional properties of importance to Native Americans.

> This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that would affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized or mitigated (WO IM 2005-003).

A second stipulation (OG-010-05-013) for Historic Trails could apply to parcel NV-08-07-069 near the Hastings Cutoff of the California Trail.

> This parcel is located in proximity to a National Historic Trail (NHT). In accordance with Federal statutes and policy, the BLM must consider potential direct adverse project effects up to a mile on either side of the NHT designated centerline and visual effects up to fifteen miles beyond centerline. Compliance requirements may necessitate project redesign or relocation and additional time to avoid adverse effects.
> Authority: National Trails System Act of 1968, National Historic Preservation Act, Nevada BLM Instruction Memoranda 2004-004 and 2004-006.

<u>Effects of Leasing Activities</u>
The act of selling geothermal leases, although not authorizing exploration, development or production prior to site specific NEPA analysis, has the potential to adversely impact cultural resources as it gives the lessee certain irrevocable rights and could foreclose the BLM authorized officer's use of some mitigation measures during operational phases.

It is anticipated that most of the cultural resources in the parcels under analysis will be archaeological and that adverse effects would tend to be either direct results of activities associated with geothermal projects, or due to increased/improved access and/or an increased human presence resulting from exploration of development projects. Generally, cultural resource density within the proposed lease parcels probably is not so high that avoidance of effects could not usually be accomplished by project redesign, relocation and monitoring. Recovery of data through archaeological excavation or intensive surface recordation might be required in some instances. The EA for the August 2006 Noncompetitive Geothermal Lease Sale (3200; BLM/EK/PL-2006/14) provides an in-depth discussion of potential effects associated with geothermal development. Based on current knowledge, project disapproval due to adverse effects to historic properties is unlikely, but the possibility cannot be dismissed at this stage of analysis.

Compared to the Proposed Action, the alternative to Defer Leasing of the Beowawe (65) and Ruby Valley (67) parcels until BLM can complete studies that are underway for identified cultural properties would provide information needed to determine if potential adverse impacts to potentially significant sites could be mitigated, in consultation with the State Historic Preservation Officer and any affected tribes.

3.2.4 Paleontological Resources

Existing Conditions

Paleontological resources are important for their potential to further our understanding of prehistoric life. Vertebrate fossils are usually considered more important than non-vertebrates due to their relative rarity. Uncommon invertebrates also would have high scientific value. No sensitive paleontological localities are known to exist within the proposed parcels but this is due to the fact that no inventories for vertebrate fossils have been conducted within these parcels. Generally, any Tertiary tuffaceous sediments would have some potential for containing vertebrate fossils. The Humboldt Formation ranks high for its vertebrate paleontological potential. Fossil fauna found in these deposits include horses, camels, rhinoceros, elephants, cat family, dog family, lagamorphs, beavers, weasel family and Brachycrus species (large horned browsers). Carlin Formation sediments have a moderate potential to contain vertebrate fossil resources. Vertebrate fossil resources that have been found in the Carlin Formation include, but are not limited to, camels, horses, and rhinoceros. Fossil potential of Quaternary deposits is fairly low due to poor preservation, but species such as horse, elephant and camel have been found (Bilbey and Firby 1997; Firby 1992).

Effects of Leasing Activities

Potential impacts to paleontological resources could occur as a result of exploration and development actions subsequent to the lease sale. Any earth disturbing activity including seismic exploration, construction of roads, drill pads, power lines and pipelines could damage or destroy important fossils or fossil localities. Other impacts could result from unauthorized removal of fossils from the site.

Most paleontological resources degrade over time due to natural forces but many survive for millions of years. Modern human activity tends to exacerbate the damage and as a consequence paleontological resources are disappearing at an increasing rate. Most of the impacts of fluid

mineral exploration and development would be mitigated through implementing protective measures as part of standard operating procedures. Given that most of these activities do not penetrate deep into the substrate where many of these fossils occur, the cumulative impact of post-leasing activities should be minimal.

3.2.5 Soil Resources

Existing Conditions
The soils of the Elko District vary widely with differing parent materials, position on the landscape, elevation, slope, aspect, and vegetation. Soils on valley floors are frequently deep, poorly drained and alkaline with a high salt content. Soils on fan piedmont remnants are moderately deep and overlie a silica cemented hardpan. Mountain soils are often shallow and form over bedrock. The pH in mountain soils is often near neutral. Geothermal exploration and development could take place on any of these soil types. Detailed soil information is available in the eight published soil surveys listed below:

Elko County Northwest Part (763)
Elko County Central Part (767)
Elko County Northeast Part (765)
Lander County North Part (775)
Eureka County (776)
Tuscarora Mountains (612)
Diamond Valley

Effects of Leasing Activities
Total projected disturbance from geothermal exploration and development in the Elko District would be about 126.5 acres over the next fifteen years. Most of these acres would be reclaimed during the projected time period. These estimates assume that roads would be reclaimed and that proliferation of roads would not occur as a result of exploration and development. Disturbance would lead to variable amounts of soil loss depending on soil type in the areas of exploration and development.

3.2.6 Water Resources (Surface/Ground)

Existing Conditions:
The Elko District receives an average of 13.2 inches of precipitation per year. Runoff from mountain ranges and perennial springs provide the major source of water for streams of the area. Major streams in this district are: The Humboldt River, Owyhee River, and Salmon Falls River. Surface water resources in the Elko District provide water for domestic use, livestock, wildlife, and recreation. Resources consist of rivers, streams, ponds, reservoirs, springs, and seeps. The quality of these waters is variable.

Groundwater is an important resource in the Elko District. There are many different aquifers with varying water quality. The ground water resources tapped by wells provide water for mining, milling, domestic use, recreation, irrigation of crops, and livestock.

Water resources and floodplains in the Elko District are subject to federal regulation as outlined in 40 CFR. The BLM could accomplish this by requiring lessees to comply with Federal, State and local standard operating procedures related to water quality and floodplain use.

The BLM is directed by section 313 of the Clean Water Act (CWA) and Executive Order 12088 to ensure compliance with pollution control requirements. Total Maximum Daily Loads (TMDLs) are an assessment of the amount of pollutant a water body could receive and not violate water quality standards. Impaired water bodies are defined as those that do not meet TMDL requirements. The Nevada Division of Environmental Protection (NDEP) implements these requirements for impaired waters, in accordance with the CWA, section 303(d). The most recent 303(d) list includes many water bodies within the Elko District.

The following table provides total stream lengths for the currently nominated lease parcels.

Table 3-1: Total Stream Lengths by Parcel

PARCEL#	Miles
NV-08-07-065	0.65
NV-08-07-069	2.31
NV-08-07-070	4.12
NV-08-07-071	5.46
NV-08-07-072	4.09
NV-08-07-073	6.68
NV-08-07-074	8.10
NV-08-07-075	7.94
NV-08-07-076	9.46
NV-08-07-077	6.34

The Wells and Elko RMPs specify that streams must be managed in a way that prevents deterioration of habitat. This includes preventing decline of water quality. The 1987 Elko RMP identifies 22 streams that are classified as high priority stream habitat, and the 1985 Wells RMP simply identifies all stream habitat.

Effects of Leasing Activities

The initial action of geothermal leasing would not affect water quality. Impacts to water resources could occur as a result of the subsequent actions (e.g. exploration, development, production, or abandonment) once a parcel is leased. The area covered by the proposed geothermal leases includes parcels that contain water resources. High priority stream habitat (Elko RMP) or stream habitat (Wells RMP) exists in or near 46% of parcels listed; Streams that fall under Clean Water Act 303(d) regulations exist in or near 89% the parcels listed; and 100 year floodplain exists within 37% of parcels listed. The following activities related to geothermal exploration and development could have an impact on these and other water resources.

Soil Disturbance: Soil could be disturbed through exploration drilling as well as construction and/or operation of facilities, fences, pipelines, gravel pits, transmission lines and roads. Additional disturbance would occur during reclamation. Disturbed soils lose cohesiveness and are eroded by moving water through rainfall events and normal stream flow. Soil solids

become suspended in water increasing turbidity. Sedimentation could also occur and negatively impact stream habitat.

Reserve pit operation: Reserve pits are designed to keep water, cuttings, drill mud, and hazardous materials from affecting surface and ground water quality. Under certain circumstances however, it is possible that these structures could fail affecting surface or ground water. In order to lessen chances of infiltration, pits could be lined with bentonite, plastic, or other synthetic liners. Even when precautionary procedures are followed there is possibility of contamination.

Drilling operations: Because wells pass through aquifers of differing water quality there is a possibility that mixing and contamination would occur. This could lead to degradation of water quality in an aquifer used for domestic or commercial use.

3.2.7 Air Quality

Air quality in northeast Nevada is generally considered good. It is an unclassified area and thus considered to be in attainment with the National Ambient Air Quality Standards (NAAQS). There is only one Class I Prevention of Significant Deterioration Area in the area of the Elko District which is located in the Jarbidge Wilderness Area. Throughout the district there are localized occurrences of dust caused by high winds, vehicular traffic, and construction activities. Local fires sometimes cause a reduction in visibility in limited areas. Air quality standards are set and regulated by the federal government and the state of Nevada. Air quality limits should not be exceeded where the public has access.

Effects of Leasing Activities

Soil disturbance from construction and/or operation of geothermal and other facilities, including fences, pipelines, gravel pits, transmission lines and roads could cause fugitive dust and affect air quality. Blowing dust could also cause a safety hazard if it occurs near transportation routes. Additional problems could occur during reclamation.

3.2.8 Vegetation

Existing Conditions

Detailed descriptions of the vegetative communities in the Elko District including meadow, big sagebrush, low sagebrush, mountain brush, pinyon-juniper woodland, broadleaf trees, shadscale, greasewood, and winterfat communities are provided in the 2003 Proposed Elko/Wells Resource Management Plan Fire Management EA (BLM 2003). Due to the extensive acreage that has burned in recent years, the spread of cheatgrass and other annual weeds has increased in the Elko District to some degree at the expense of native vegetation, particularly sagebrush habitat. Currently the Elko District is actively participating in restoration and rehabilitation efforts in the burned areas, and in the Great Basin Restoration Initiative as well as in aquatic and terrestrial fish and wildlife habitat improvement projects to improve conditions and help meet rangeland health standards for riparian and upland communities.

Effects of Leasing Activities

The initial action of geothermal leasing does not affect vegetation resources. However, surface disturbing activities for exploration and production would affect vegetation resources. Construction of well pads, fences, access roads, pipelines, power plants and associated facilities such as electric transmission lines would remove vegetation and increase the risk of invasion by cheatgrass or other non-native and annual weeds. As projected by the Reasonably Foreseeable Development scenario (**Appendix A**), a total of 126.5 acres is anticipated to be disturbed throughout the Elko District from future exploration and development of geothermal resources. Most acres would be reclaimed within one year of disturbance. Seeding is used in the reclamation process to provide a desirable plant community. Often, an abandoned well location is seeded and fenced as an exclosure to protect the vegetation as it is being established. The protective fence would normally be temporary and would be removed once reclamation is completed. A more detailed analysis of impacts to vegetation resources would be completed in a site specific EA before surface disturbing activities are authorized. The amount of disturbance, reduced by reclamation efforts, should not affect the vegetation composition and quality of vegetation of the plant communities in which most development occurs. Impacts to vegetation resources related to post-leasing activities would not be considered substantive.

3.2.9 Livestock Grazing

Livestock grazing throughout the Elko District has been allocated for 726,416 Animal Unit Months (AUMs), which is the amount of forage consumed in a month by a cow and calf or five sheep. The total permitted use is distributed among about 243 grazing allotments grazed by 196 permittees. Authorized types of livestock include cattle, sheep and horses. While several different plant communities exist throughout the district with varying amounts of forage, as an average it takes approximately 10 acres to equal one AUM. Grazing use is periodically evaluated and changes in grazing management are made to meet and rangeland health standards and allotment-specific multiple use objectives.

The following table identifies grazing allotment(s) and permittee(s) for the nominated parcels.

Table 3-2: Grazing Allotment Permits by Parcel

Parcel #(s)	Grazing Allotment(s)	Authorized Permittee(s)
NV-08-07-065	Geyser	Elko Land And Livestock Company
NV-08-07-069	Ruby 6	Steve Neff Company, Inc John E. Neff Company Inc. J Bar M Ranch
NV-08-07-070, 71, 72	Black Butte	William Max
NV-08-07-070, 71, 72	Westside	Peavey-Sims Partnership
NV-08-07-070, 71, 72, 73	Lower Mary's	Cross Ranch Grazing LLC
NV-08-07-070, 71, 72, 73	Deeth	Cross Ranch Grazing LLC Eureka Livestock LLC Brough Partnership
NV-08-07-074, 75, 76, 77	Valley Mountain	Ken Jones
NV-08-07-074, 76, 77	North Butte Valley	Stuart Taylor

In general, the parcels proposed for leasing comprise a small portion of the affected allotments:

Table 3-3: Grazing Allotment Acres by Parcel

Parcel number	Grazing Allotment	Parcel Acres in Allotment	Allotment Acres
NV-08-07-065	**Geyser**	**625**	**102,934**
NV-08-07-069	**Ruby 6**	**1866**	**16,731**
NV-08-07-070	**Black Butte**	**620**	**51,788**
NV-08-07-071	Westside	478	
NV-08-07-072	Westside	232	
TOTAL ACRES	**Westside**	**711**	**7,874**
NV-08-07-070	Lower Mary's	84	
NV-08-07-071	Lower Mary's	168	
NV-08-07-072	Lower Mary's	173	
NV-08-07-073	Lower Mary's	30	
TOTAL ACRES	**Lower Mary's**	**455**	**6,052**
NV-08-07-070	Deeth	1389	
NV-08-07-071	Deeth	1413	
NV-08-07-072	Deeth	666	
NV-08-07-073	Deeth	1811	
TOTAL ACRES	**Deeth**	**3889**	**141,500**
NV-08-07-074	Valley Mountain	3447	
NV-08-07-075	Valley Mountain	5105	
NV-08-07-076	Valley Mountain	843	
NV-08-07-077	Valley Mountain	3105	
TOTAL ACRES	**Valley Mountain**	**12500**	**268,068**
NV08-07-074	North Butte Valley	1703	
NV-08-07-076	North Butte Valley	3783	59,343
NV-08-07-077	North Butte Valley	1993	
TOTAL ACRES	**North Butte Valley**	**7483**	

Effects of Leasing Activities

The initial action of geothermal leasing would not affect livestock grazing. Impacts to livestock grazing could occur as a result of the subsequent actions (e.g. exploration, development, production, or abandonment) once a parcel is leased. The impact would be loss of vegetation equivalent to about 13 AUMs of forage for active areas disturbed by operations. The disturbance

would be confined to small areas, usually for a temporary period of time until revegetation can be established (two to five years) and once established would be available for consumption by livestock and wildlife. Thus, the estimated total loss of forage would be equivalent to approximately 13 AUMs.

Short-term disturbance to livestock grazing could occur during exploration and development phases. This would include livestock avoiding certain areas due to traffic, drilling, and construction of facilities such as power lines and pipelines. This disturbance would be limited to the construction period and would not cause a major impact to livestock distribution. Because of the usually dispersed nature of active areas disturbed by geothermal activities, reclamation of disturbed sites, and varying degrees of damage to vegetation, a reduction in active permitted use would not be required. High concentrations of surface disturbance on one or more grazing allotments could lead to reductions in livestock grazing on those affected allotments, if the issue is identified for site-specific analysis of geothermal activities.

Operation of developed facilities is not expected to conflict with livestock use of the area.

3.2.10 Forest Resources

Existing Condition

Forest (or woodland) resources exist on some of the lands proposed for leasing within the District. The forest resource species are pinyon, juniper, aspen, and mahogany. Most geothermal exploration and development occurs in valley floors, usually away from forested areas. The following table shows acres of forest resources by parcel.

Table 3-4: Forest Acres By Parcel

Parcel	Acres
NV-08-07-065	12.64
NV-08-07-069	18.68
NV-08-07-070	27.52
NV-08-07-071	12.00
NV-08-07-072	13.79
NV-08-07-073	14.17
NV-08-07-074	270.17
NV-08-07-075	1.33
NV-08-07-076	94.83
NV-08-07-077	59.68

Effects of Leasing Activities

Impacts to forest resources as a result of the exploration, development, production or abandonment of geothermal activities could include removal of trees for the construction of roads and facilities, loss of woodland products such as firewood or pine nuts, loss of wildlife habitat such as nesting and perch sites, and changes in risk of wildfire in the area.

3.2.11 Recreation

Existing Conditions

The Elko District has 7.2 million acres of public land open to recreational pursuits. It is estimated that in 2004, there were 1.3 million visitors to public lands in the Elko District. There are six designated Special Recreation Management Areas (SRMAs), three of those are developed campgrounds, two are boating areas and one is a natural area. Over 380 miles of the California National Historic Trail are in the Elko District. There are scenic byways, wildlife viewing areas, historic mining districts, many fishable lakes, reservoirs and streams, recreation trails and various other opportunities for dispersed recreation. Popular dispersed recreation activities Include hunting, riding off highway vehicles (OHVs), fishing, sightseeing, boating, mountain biking, camping and hiking.

Vehicles are limited to designated routes in all the SRMAs and Wilderness Study Areas. The remaining acres are open for vehicle use.

The Elko Office administers 6 competitive events on the district each year and permits over 30 commercial outfitter and guides. The events are vehicle races, motorcycle races and mountain bike races. Commercial outfitter and guides offer various hunting services and guided recreation opportunities on public lands.

Effects of Leasing Activities

The initial action of geothermal leasing would not affect recreation. Impacts to recreation would occur as a result of the subsequent actions (e.g. exploration, development, production and abandonment) once a parcel is leased. Restricting access and occupancy in and near the designated recreation areas, as shown in Appendix B, reduces impacts to an acceptable level.

Dispersed recreation would be impacted by the presence of people, structures and equipment in an area not previously occupied. Some recreationists would cease using areas for recreation because of geothermal development. Vehicles and noise could scare off animals that recreationists are hunting or detract from the feeling of solitude in the vicinity of a new development.

During many phases of geothermal development, new routes would be created as a result of fence construction, power line construction and pipeline construction. In general, new routes lead to greater access for recreationists as well as open areas for recreational opportunities that were once difficult to reach. Fences or development could also restrict public access by blocking off areas originally accessible to the general public.

Public safety is a concern with any development and the general public would need to be prevented from accessing areas of development. With development such as well pad construction and facility construction, traffic increases in the area causes another public safety concern.

During reclamation, not all new routes would be rehabilitated; some would remain as public access routes. Over the long term, recreation access would increase.

3.2.12 Visual Resource Management

Existing Conditions

The Elko District is part of the Basin and Range landscape type. Elevations range from 4,400 ft in the valleys to 11,000 ft in the mountains. Much of the district could be classified as a panoramic landscape with horizontal lines forming the valleys and vertical lines forming the mountains. Many of the basins are sagebrush vegetation type with grasses and other small shrubs intermixed. Colors in the valleys are light greens and browns. As elevation increases up-slope, vegetation type changes to pinion-juniper type. Colors change to darker greens and browns. The panoramic view causes the vegetation form to be very smooth and the landform to be rough. There are various rock outcrops and variations in the soil colors.

Modern man made features in the Elko District range from highways and power lines to fences, roads, communication sites, and range developments. There are also prehistoric and historic man-made features in the District. There are many man-made features; some more dominant than others depending on one's exact location.

Visual resources are identified through the Visual Resource Management (VRM) inventory. This inventory consists of a scenic quality evaluation, sensitivity level analysis, and delineation of distance zones. Based on these factors, BLM-administered lands are placed into four visual resource inventory classes: VRM Classes I, II, III, and IV. Classes I and II are the most valued, Class III represents a moderate value and Class IV is of the least value. VRM classes serve two purposes: (1) as an inventory tool that portrays the relative value of visual resources in the area, and (2) as a management tool that provides an objective for managing visual resources.

Class I is assigned to all special management areas where the current management situation requires maintaining a natural environment essentially unaltered by humans. On the Elko District Wilderness Study Areas are assigned Class I objectives.

The Class II VRM objective is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities would be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

The Class III VRM objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities would attract attention but should not dominate the view of the causal observer. Changes should repeat the basic elements found in the predominant natural features of the landscape. So changes caused by management activities would be evident and begin to attract attention, but these changes should remain subordinate to the existing landscape.

The Class IV VRM objective is to allow for management activities which involve major modification of the existing character of the landscape. The level of contrast could be high dominating the landscape and the focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements of the characteristic landscape.

The following table shows the Elko VRM inventory classes for the proposed parcels.

Table 3-5: Visual Resource Management Class By Parcel

Parcel Number	Acres	Class
NV-08-07-065	624	IV
NV-08-07-069	221 2036	III IV
NV-08-07-070	2093	IV
NV-08-07-071	2060	IV
NV-08-07-072	1091	IV
NV-08-07-073	1954	IV
NV-08-07-074	5149	IV
NV-08-07-075	5105	IV
NV-08-07-076	487 4137	III IV
NV-08-07-077	5102	IV

In addition to the above Classes, the Elko and Wells Resource Management Plans established a Low Visibility Corridor along I-80. Visual impacts are to be minimized within 1.5 miles on either side of the highway. Within this three-mile wide corridor, the objective is for management actions not to be evident in the characteristic landscape. Management objectives for Class II VRM areas are used as a guideline when evaluating projects within the Low Visibility Corridor. None of the currently proposed lease parcels occur near the I-80 Low Visibility corridor.

Effects of Leasing Activities

Currently when a permit to explore or other proposal for ground disturbing activities is received an analysis would be done to determine which VRM Class the development falls under using the established inventory classes as a guideline. If a visual contrast rating is completed and the area falls under a higher VRM Class, management has the authority to apply higher Class objectives to the area.

The development of leased lands for geothermal resources would create strong contrasts between the project features and the existing landscape. All the dominant elements of the visual landscape (form, line color, and texture) would be affected.

Building roads would superimpose visual lines that would appear in sharp contrast with horizontally aligned hills and the continuous, uninterrupted vegetation in the area. Removal of vegetation due to road and drill pad construction would expose bare soil much lighter in color and smoother in texture than the surrounding vegetation. This would superimpose visible lines and openings in vegetation that is otherwise uniform and which covers all the landscape. Those

contrasts would be visible to anyone in the area. However surface disturbances would be less visible as they moved away form the viewer. Roads would be highly visible as the observer looked along them but less visible when the observer looked across them.

Permanent structures such as power generating facilities would cause substantial contrast to form, line, texture and potentially to color as well. Essentially, there are very few structures present in the proposed lease areas and the future structures would be square or rectangular or cylindrical in form, they would have a vertical alignment, and they would be smooth in texture. This would be in sharp contrast with the low, gently rolling hills and valleys of the characteristic landscape. In open country they would be visible at great distances. The visibility of the structures would be enhanced if they were painted an inappropriate color. Roads, especially as the viewer looks along them would create lines that would usually be the opposite of the natural horizontal lines in the landscape.

The length of time required for re-vegetation would be fairly long. Grasses could be re-established in a season or two but it takes several years to re-establish sagebrush, the dominant vegetative species in the area.

Even though the issuance of leases would cause impacts to all the elements of the visual landscape (form, line, color, and texture), they would conform to the Class III and IV Visual Resource Management objective for proposed geothermal lease areas. Under the assumption that a number of wells would be drilled and that they would be successful, substantial changes in the visual landscape could result as the leased area is developed.

3.2.13 Native American Concerns

Existing Conditions

Located within traditional territory of the Western Shoshone, the BLM Elko Field Office administrative boundary contains spiritual/traditional/cultural resources, sites, and social practices that aid in maintaining and strengthening social, cultural, and spiritual integrity. Recognized tribes with interests within the BLM Elko Field Office administrative boundary are the Te-Moak Tribe of Western Shoshone (Elko, South Fork, Wells, and Battle Mountain Bands), Duck Valley Sho-Pai Tribes of Idaho and Nevada, Duckwater Shoshone Tribe, Ely Shoshone Tribe, Fort Hall Shoshone-Bannock Tribes of Idaho, Ibapah Goshute of Utah and Nevada, Skull Valley Goshute of Utah, Yomba Shoshone, and various other community members and groups.

Initial coordination/communication efforts were made to several of the tribes noted above with detailed efforts (fax, phone, email, meeting notes) being on file at the Elko BLM Field Office and considered confidential. The tribes have not had sufficient time to gather specific information about the proposed leases. However, consultation efforts for other geothermal leases as well as other BLM proposed projects have resulted in the identification of areas of tribal concern.

The Elko District is currently funding an ethnographic study of Ruby Valley in order to better delineate this area. An alternative to the Proposed Action is to defer leasing of the parcel in

Ruby Valley (NV-08-07-069) until the ethnography is completed and the BLM is better able to determine the extent of and possible adverse effects to these areas of tribal concern.

The Geysers, near Beowawe have also previously been identified as an unevaluated traditional cultural property (TCP). More information is needed from the tribes before the BLM could determine effects of leasing activities. Consultation efforts are ongoing. The parcel near Beowawe (NV-08-07-065) should also be deferred until the BLM is able to determine the potential for possible adverse effects to The Geysers TCP.

Effects of Leasing Activities

Although the act of selling geothermal leases would not authorize any exploration, development, or production, or any related ground disturbance activities, the potential exists to impact Native American sites of spiritual/cultural/traditional nature. If a lease is sold, the lessee would retain irrevocable rights. Inclusion of the Cultural Resources and Native American Consultation stipulation (OG-010-05-03) in all leases would allow the authorized officer's use of mitigation measures. According to 43 CFR 3101.1-2, once a lease is issued to its owner, that owner has the "right to use so much of the lease lands as is necessary to explore for, drill for, mine, extract, remove and dispose of the leased resource in the leasehold" … subject to specific nondiscretionary statutes and lease stipulations. Although the act of issuing a lease itself would not pose an immediate physical threat to tribal resources or cultural/traditional/spiritual use sites and activities, any subsequent proposal to explore or develop would potentially cause an adverse impact.

It has been expressed that the issuing of a lease within culturally sensitive areas (Spruce Mountain, Roberts Mountain, Ruby Valley, North of Wells, etc.) would later compromise the future use (possible future impacts to physical and thus spiritual integrity) of such sites by community members. Compared to the Proposed Action, the alternative of deferring leasing of parcel #65 near Beowawe and The Geyser TCP and parcel #69 in Ruby Valley would allow BLM to continue consultation with tribes to address any potential conflicts from leasing activities.

3.2.14 Wild Horses

Existing Conditions

There are eight wild horse herd management areas (HMA) managed by the Elko Field Office. They are the Owyhee, Rock Creek, Little Humboldt, Diamond Hills North, Maverick-Medicine, Antelope Valley, Goshute, and Spruce-Pequop HMAs. These eight HMAs total approximately 1.8 million acres and have an appropriate management level (AML) of 1,338 wild horses. Wild horses inhabit these HMAs year round.

The currently proposed lease parcels in the vicinity of Butte Valley are in the Maverick Medicine HMA.

Table 3-6: Proposed Leases in a Wild Horse Herd Management Area

Parcel Number	Acres	HMA Name
NV-08-07-074	5149	Maverick-Medicine
NV-08-07-075	4901	Maverick-Medicine
NV-08-07-076	1810	Maverick-Medicine
NV-08-07-077	3383	Maverick-Medicine

Effects of Leasing Activities

Future exploration could affect wild horses within those areas. Increased human and motorized activity could disrupt and displace wild horses. The bands inhabiting the area of the exploration would very likely leave the area and move away from the noise and activity. During any long term or permanent activity it is probable that wild horses over time would become accustomed to the activity and resume normal activities at a reasonable distance. Construction of new fences as part of development production facilities could disrupt movement of free roaming wild horses and animals could be injured by colliding if any new fencing occurs. It is not likely that any wild horses would be affected by fences constructed on these leases due to the distance separating these leases from the HMAs.

3.2.15 Invasive, Nonnative Species

Existing Conditions

Invasive, nonnative species occur in some areas with the potential for geothermal exploration or development. Invasive, nonnative species, including Nevada designated noxious weed species are aggressive, typically nonnative, ecologically damaging, undesirable plants, which severely threaten biodiversity, habitat quality and ecosystems. Because of their aggressive nature, invasive, nonnative weed species may eventually spread into established plant communities. Noxious weed species that reproduce vegetatively and through seed production, include Russian knapweed, hoary cress and Canada thistle. Ground disturbance tends to cause an increase of these species. Wildland fires in the northern Great Basin have amplified the opportunity for an increase of invasive weed species. Wildland fires provide a fertile environment, usually without competition from native species, for weed species to become established.

Effects of Leasing Activities

The construction activities associated with the development of geothermal exploration have the potential to create invasions or spread existing infestations. Road construction necessary to implement geothermal exploration/development could cause invasion or spread of invasive, nonnative species. The level of disturbance is proportional to the likelihood of invasion/spread. Vehicles are a primary vector in the spread of invasive weed species. Seeds and plant propagules could become lodged in tires and undercarriages and deposited in relatively weed free areas. Implementation of mitigation measures help to reduce the risk of invasion by nonnative species.

3.2.16 Wetlands/Riparian Zones

Existing Conditions

The Elko District administers 63,000 acres of BLM wetlands associated with springs, seeps and wet meadows (5,500 acres), areas along the banks of streams (14,000 acres associated with 450 stream channel miles) and 43,500 acres of aspen not directly associated with surface water (Nevada Department of Wildlife, 1989). Riparian areas in the district are characterized by woody plant communities dominated by aspen, alder and willow at the higher elevations and wet or semi-wet meadow habitats comprised of willows and herbaceous riparian species at the lower elevations. Riparian communities are extremely important to wildlife and are popular recreational areas. They are also highly susceptible to impacts and most within the district have already been impacted by various land use activities, such as grazing, mining, and off highway vehicle recreational activities.

Data on functioning condition of seeps and springs on public lands has been collected since 1999. Springs and riparian areas are highly important for wildlife use. Habitat conditions for streams are highly variable, and priorities for assessment depend largely on management initiatives such as activities to recover or conserve listed and sensitive species. Some of the more important streams such as Trout Creek, Marys River (Parcel #s NV-08-07-072 and 73), Hank's Creek, East and West Forks of Beaver Creek, Willow Creek, Owyhee River, Sherman Creek, Four Mile Creek and the North Fork of the Humboldt River, are either fenced or have had recent changes in grazing management practices resulting in improved habitat conditions with an upward trend.

Data for springs and streams in the proposed lease parcels is limited. There are no perennial inventoried drainages or springs for the Beowawe parcel (**NV-08-07-065**), but there are large spring complexes associated with Hot Springs and Geyser Complexes to the west. There is no data on functioning condition for the six perennial spring habitats in the vicinity of parcel **#NV-08-07-069** and the intermittent and perennial streams (Withington Creek and the Franklin River) in Ruby Valley. **Parcels #s NV-08-07-072 and 73** include aquatic habitat, and the Marys River in Parcel 72 has been rated as Functional at Risk with an Upward Trend. In the Ruby and Butte Valleys area, there are 17 perennial spring habitats in the vicinity of **Parcel #s NV-08-07-074, -075, -076, and –077**, eight of which have been rated as Functional At Risk. The streams in the vicinity of the parcels are all intermittent.

Effects of Leasing Activities

Initial leasing of geothermal parcels would not have a direct effect on riparian resources associated with the springs and drainages in the geothermal lease areas, but initial surface disturbing activities of geothermal exploration and facility construction could occur within the vicinity of a spring or stream riparian area. The impacts would include varying degrees of habitat loss depending on the sensitivity of the riparian system and the proximity of the exploration and/or construction activities. Impacts could include increased sediment loads due to ground clearing, loss of vegetative communities, as well as accelerated erosion due to road construction. Sedimentation could increase turbidity levels, reducing available light and riparian plant production. Any degree of habitat loss to a riparian system opens the area to invasion by upland and/or weed species. Exploration or construction activities that have the potential for

riparian habitat removal or degradation would have to be evaluated at the time the proposed leasing activities are submitted.

Normal geothermal plant operations should have minimal effect on any nearby riparian areas once facility construction is completed. Exceptions to this are incidences where spills, emissions or plant personnel activity cause degradation to water quality or riparian communities. Discharge of treated waters could have variable effects on the riparian community, depending on the water quality. Increased moisture in drainages could accelerate riparian plant establishment, changing the existing vegetative composition. Temperatures of discharge waters are usually high and algae and/or moss production could increase as a result of such water entering any standing water bodies. Additional monitoring measures could be employed where potential for impacts to riparian areas through facility operations are high.

Upland reclamation of the drilling site has the potential to increase sedimentation loads to any nearby drainage during the initial phases. It is unlikely that any viable riparian area would be disturbed for geothermal drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas. Remediation measures to reduce possible impacts to riparian areas should be established when the exploration and development plans are submitted.

3.2.17 Fisheries

Existing Conditions

The Elko District administers approximately 1,100 perennial miles of stream that has the potential to harbor a variety of aquatic species including 23 game and 21 non-game fish species.

Table 3-7: Elko District Fish Species

Native Game Fish	Non-Native Game Fish	Native Non-Game Fish	Non-Native Non-Game Fish
Lahontan cutthroat trout *(Threatened)* Inland Columbia Basin redband trout Bull trout Mountain whitefish Yellowstone cutthroat trout	Channel catfish Largemouth bass Smallmouth bass Rainbow trout Brook trout Brown trout Bowcutt trout White crappie Wiper Black bullhead Tiger trout White catfish Yellow perch Bluegill Tiger muskie Northern pike Green sunfish Redear sunfish Bluegills Mountain Whitefish	Lahontan speckled dace Longnose dace Independence Valley speckled dace *(Endangered)* Clover Valley speckled dace *(Endangered)* Relict dace Lahontan redside shiner Lahontan mountain sucker Tahoe sucker Bridgelip sucker Utah sucker Northern pikeminnow Piute sculpin Mottled sculpin Tui chub Independence Valley tui chub Leatherside chub Chiselmouth	Common carp Western mosquitofish

Source: Nevada Department of Wildlife (NDOW) (2005).

As noted in the previous section, the currently proposed lease parcels in the Marys River drainage (**NV-08-07-072 and 73)** includes aquatic habitat that is important for special status species, including the threatened Lahontan cutthroat trout (see section 3.2.20).

Geothermal exploration and development has the potential to degrade, displace or destroy fish populations through either direct contact or through the degradation or removal of important habitat. Fisheries resources that could be affected differ among drilling facility types, and effects of development on these resources would be assessed at the time an individual exploration or development proposal is submitted. Fisheries resources occupying larger aquatic habitats (e.g., streams, rivers, reservoirs, and marshlands) could be adversely affected by increased activity in riparian systems (e.g., road construction, disturbances that create barriers to movement, increased erosion, sedimentation, reduced 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. Of the parcels nominated for sale it is unknown at this time which fish species would be present within the drainages and springs sources. The presence and sensitivity of fish populations in drainages located near proposed drill sites would be determined at the time of exploration and development activities are submitted and where appropriate, limitations and/or monitoring would be imposed.

Effects of Leasing Activities

Initial leasing of parcels would not have a direct effect on fish populations, but initial surface disturbing activities of exploration and facility construction of lease parcels could occur within the vicinity of a spring or stream riparian area with resident fish populations. Normal geothermal plant operations could range from having minimal effects on fish populations with the exception of accidental degradation to substantial reduction in water quantity, and hence habitat, from active water pumping activities. Plans to contain spills of toxic substances, such as engine oil and production fluids, are required for leasing activities to prevent degradation of water quality, which could vary depending on the amount and toxicity of the particular contaminant. The impacts would include varying degrees of habitat loss depending on the sensitivity of the riparian system and the proximity of the exploration and/or construction activities, reduced water quality due to increased sedimentation or introduction of hazardous substances; dewatering due to pumping activities and the release of water through drill holes, and fish mortality or displacement due to any activity with the potential to decrease or degrade viable habitat. Increases in sedimentation due to ground clearing, loss of vegetative communities, as well as accelerated erosion due to road construction would have a net effect of increases in stream silt loads that could smother spawning gravels, increase turbidity, decrease dissolved oxygen, and destroy or reduce overall aquatic productivity. Geothermal drilling normally occurs in hydrologic areas where water temperatures are too high for fish populations, but surface drainages that have viable fish habitat would pass through the same vicinity. Any degree of habitat loss to a riparian system opens the area to invasion by upland and/or weed species. Remediation and monitoring should be established at the time activities are proposed that would reduce possible impacts of exploration or construction that have the potential for riparian habitat removal/degradation to drainages inhabited by fish populations.

Normal plant operations could have dewatering effects on any nearby riparian areas once facility construction is completed. These effects include a decrease in the riparian community and increases in water temperature due to decreased flows. Other effects include incidences where spills, emissions or plant personnel activity cause degradation to water quality or riparian communities. Discharge of treated waters could have variable effects on the riparian community, depending on the water quality. Increased moisture in drainages could accelerate riparian plant establishment, changing the existing vegetative composition. Temperatures of discharge waters are usually high and algae and/or moss production could increase as a result of such water entering any standing water bodies. Additional monitoring measures would need to be employed where potential for impacts to riparian areas through facility operations are high.

Upland reclamation of the drilling site has the potential to increase sedimentation loads to any nearby drainage during the initial phases. It is unlikely, though, that any viable riparian area would be disturbed for geothermal drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas.

3.2.18 Wildlife

Existing Conditions

As per the BLM Elko Field Office wildlife species list, there are approximately 246 bird species, 28 reptile and amphibian species and 76 mammalian species that inhabit the Elko District on a seasonal or yearlong basis (BLM, 2005).

Big Game

Studies to monitor big game habitat were first established in 1980 and to date have been established on all mule deer winter and summer ranges, and on antelope winter and yearlong ranges. These studies indicate that habitat conditions on winter ranges for both species have declined. Mule deer and especially antelope rely heavily on this winter habitat due to the limited range of these areas. For mule deer, the decline has been primarily a result of fires that have reduced the shrub component of the habitat, mining activities that have caused habitat fragmentation or habitat alteration, and livestock overuse of key browse species that has reduced forage quantity and plant species diversity. Antelope habitat condition has also declined due to fires on winter ranges and competition with domestic livestock for preferred forbs and grasses.

Mule deer occur throughout the Elko District. Approximately 38% of the district is designated as mule deer summer habitat, 8.5% yearlong habitat, 12 % winter habitat, and 29% intermediate habitat. Only 2% of the district inhabited by mule deer has not been analyzed for habitat criteria. These habitats support approximately, 45,825 mule deer throughout the year. This shows a declining trend in mule deer numbers from the 1998 count of approximately 54,332 animals, 2000 count of 56,543, and the 2006 trend count of 47,700, but is above the estimated numbers from the 2004 count of 37,900 individuals (NDOW, Big Game Status 1997-1998, 1999-2000, 2003-2004, 2006-2007, 2007-2008). The estimated forage demand for mule deer is 90,962 AUMs.

Pronghorn antelope occur throughout the Elko District. Approximately 56% of the district is designated as antelope summer habitat, 16.5% yearlong habitat, 4% winter habitat, and 1% intermediate habitat. Only 9% of the district inhabited by antelope has not been analyzed for

habitat criteria. These habitats provide for an estimated 5,515 antelope. This shows an increasing trend in pronghorn antelope numbers from the 1998 trend count of approximately 2,783 animals, 2000 count of 3,528, and 2004 count of 4,295 individuals (NDOW, Big Game Status 1997-1998, 1999-2000, 2003-2004, 2007-2008). The estimated forage demand for antelope is 10,308 AUMs.

Crucial Seasonal Big Game Stipulations
Seasonal restrictions from disturbance in crucial ranges apply during the period 11/15-3/16, inclusive. Determining wintering season buffer zones for pronghorn antelope and mule deer on a site-specific basis would increase the protection BLM could afford these animals. Winter range is limited and dates reflect when large numbers of animals reside on these small areas, to prevent detrimental displacement from these areas on these dates due to land use disturbance.

California bighorn sheep are currently established in the Snowstorm mountain range and just north-east of this location along Castle Ridge within the South Fork of the Little Humboldt River area. They also reside around Big Butte, just south of Squaw Valley and within a small range just south-west of Squaw Valley. Rocky mountain bighorn sheep have been documented in the Pilot range around Pilot Peak and just south of the Ellen D range. A release of bighorn sheep into the Sheep Creek Range was completed in 1991. Bighorn sheep are also currently established in the Ruby Mountains and East Humboldt Range. These habitats provide for an estimated 600 sheep (approximately 160 California and 440 Rocky Mountain), which is an increase from 2004 numbers of 400 sheep (approximately 150 California and 250 Rocky Mountain) (NDOW , Big Game Status 2003-2004, Big Game Status 2007-2008).

Rocky Mountain Elk currently reside on approximately 3,934,868 acres within the Elko District, mostly on the Wells side. This area is expanding each year as herd numbers increase within the Elko District. There were approximately 2,009 animals recorded in 2004 and 3,800 individuals recorded in 2008 (NDOW, Big Game Status 2003-2004, 2007-2008), with sizable herds in the Beaver Creek and Spruce Mountain areas. These numbers show a recent increase in herd sizes in the western portion of Elko County (NDOW, 2002). As yet seasonal use areas are unknown.

Bats
Fifteen bat species have been documented in the Elko District: Pallid Bat, Townsend's Big-eared Bat, Big Brown Bat, Silver Haired Bat, Western Red Bat, Hoary Bat, California Myotis, Western Small-footed Myotis, Little Brown Myotis, Long-eared Myotis, Long-legged Myotis, Yuma Myotis, Western Pipistrelle, Brazilian Free-tailed Bat, and the Fringed Myotis (Nevada Bat Conservation Group, 2002).

Raptors
Nineteen raptor species, most of which are managed as sensitive species, occur in the Elko District. The following have known nest sites within the District: American Kestrel, Burrowing Owl, Cooper's Hawk, Ferruginous Hawk, Golden Eagle, Great Horned Owl, Northern Goshawk, Prairie Falcon, Red-tailed Hawk, Sharp-shinned Hawk, Swainson's Hawk, and Long-eared Owl. The Short-eared Owl, Barn Owl, and Northern Harrier have unconfirmed nesting sites as young of the year have been observed. The Bald Eagle, Red-shouldered Hawk, Merlin, Gyrfalcon, and the Flammulated Owl are known to forage in the Elko District (BLM Raptor Listing, 2005).

The following seasonal *Raptor Nesting and Foraging Stipulation* is included in all leases:

This lease contains lands which have known raptor foraging areas and are subject to seasonal protection from disturbance.

A. Seasonal restrictions from disturbance apply to 0.5 mile radius around nesting sites of Golden Eagles and Great Horned Owls during the period 1/1-6/30, inclusive.
B. Seasonal restrictions from disturbance apply to 0.5 mile radius around Long-eared Owl nesting sites during the period 2/1-5/15, inclusive.
C. Seasonal restrictions from disturbance apply to 0.5 mile radius around Prairie Falcon nesting sites during period 3/1-6/30, inclusive.
D. Seasonal restrictions from disturbance apply to 0.5 mile radius around Ferruginous Hawk, Northern Harrier and Barn Owl nesting sites during period 3/1-7/31, inclusive.
E. Seasonal restrictions from disturbance apply to 0.5 mile radius around Goshawk Hawk and Sharp-shinned Hawk nesting sites during period 3/15-7/15, inclusive.
F. Seasonal restrictions from disturbance apply to 0.5 mile radius around nesting sites of Cooper's Hawks, Kestrels, and Burrowing Owls during the period 4/1-6/30, inclusive.
G. Seasonal restrictions from disturbance apply to 0.5 mile radius around Red-tailed Hawk and Swainson's Hawk nesting sites during the period 4/1-7/15, inclusive.
H. Seasonal restrictions from disturbance apply to 0.5 mile radius around Short-eared Owl nesting sites during the period 2/1-6/15, inclusive.

Based on nesting surveys conducted prior to disturbance activities, seasonal buffer zones for active raptor nests are determined on a site specific basis to increase the protection BLM could afford raptors. An arbitrarily determined buffer zone, such as the ½ mile radius specified for each species above, could be inadequate to prevent line-of-sight contact between nesting raptor and disturbing human intrusions, particularly in open country. Furthermore, if a nest is readily visible to humans, it is more susceptible to vandalism. On the other hand, in rough or forested terrain, a ½ mile radius could be larger than necessary to prevent disturbance of a nesting raptor. As leasing proposals are being reviewed, appropriate buffer zones should be specified.

Review of the Elko District database showed the following raptors are known to nest and/or forage in the currently proposed lease parcels. Therefore, the seasonal restrictions specified by the raptor nesting and foraging stipulation would likely apply to future leasing activities.

Table 3.8 Potential Occurrence of Raptors on Nominated Parcels

Raptor	***Species-specific Seasonal Limitations by Parcel No.***									
	65	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**
Golden Eagle	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*	*A*
Ferruginous Hawk	*D*	*D*	*D*	*D*	*D*	*D*	*D*	*D*	*D*	*D*
Flammulated Owl							*X*	*X*	*X*	*X*
Northern Goshawk		*E*					*E*	*E*	*E*	*E*
Western Burrowing Owl	***F***	***F***	***F***	***F***	***F***	***F***	***F***	***F***	***F***	***F***

Sage Grouse

Greater sage grouse is a BLM-sensitive species that has been petitioned for listing under the ESA, and so is also discussed in the "Special Status Species" section of this EA (3.3.21). As of December 2003, the sage grouse population was estimated to be 45,100 birds for the Elko District (Elko County Sagebrush Ecosystem Conservation Strategy), and the extensive amount of sage grouse habitat burned in recent years has heightened concerns for this sensitive species. The Elko District includes approximately 900 strutting grounds or leks (traditional breeding areas where males congregate to display each spring), and nesting and brood rearing areas are concentrated in suitable habitats within a 2 miles radius of the leks. A variety of habitats,

consisting of sagebrush stands of different height, density, and species, are used in winter depending on climatic conditions and forage availability and quality. These habitats are usually more extensive in area than the other seasonal habitats.

Sage Grouse Stipulations
Sage grouse leks are subject to seasonal protection from disturbance (OG-010-05-07). No surface occupancy is permitted within 0 5 miles of leks, or other lesser distance based on site-specific conditions.

Sage grouse brood rearing areas are subject to seasonal protection from disturbance (OG-010-05-08). Seasonal restrictions from disturbance in sage grouse brood rearing areas apply within 0.5 miles or other appropriate distance based on site-specific conditions from 5/15 to 8/15, inclusive. This restriction does not apply to operating facilities.

Sage Grouse Crucial Winter Habitat crucial winter habitat is subject to seasonal protection from disturbance (OG-010-05-09), which applies from November 1 to March 15. This stipulation does not apply to operating facilities.

Except for the Beowawe parcel # 69 and the Marys River parcel #s 76 and 77, all of the parcels proposed for leasing are known to have leks and/or are within sage grouse summer, winter and nesting/brood rearing habitat. All of the Marys River parcels are in the vicinity of sage leks or seasonal habitat use areas (**Maps 3b and 4b**).

Effects of Leasing Activities

Geothermal development could affect wildlife in a variety of direct and indirect ways. Initial surface disturbing activities of geothermal exploration and facility construction of lease parcels have a probability of occurring within the vicinity of resident wildlife populations and specific wildlife habitats. Environmental effects of geothermal resource development are similar to other activities affecting terrestrial, riparian and aquatic habitat. 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 construction and/or power line construction.

Big game, small game and nongame mammals and birds are most affected by loss of food and cover, although blading for drill pads and construction of roads kills some outright. Geothermal development could adversely impact breeding, nesting, brood-rearing, winter and summer habitat for wildlife 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 the coming years breeding success. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

The condition of lands throughout the district with respect to meeting rangeland health objectives for wildlife habitat are assessed in accordance with District priorities for renewing grazing permits, and burned areas are assessed and monitored for meeting fire rehabilitation objectives. The following table lists the acres by habitat type encompassed by the nominated parcels.

Table 3-9: Habitat Types Encompassed by Proposed Lease Parcels

Vegetation Type	Acres per Parcel									
PARCEL NUMBER	65	69	70	71	72	73	74	75	76	77
TOTAL ACRES	1267.83	2240.00	2084.98	2040.00	1278.85	1,840.00	5095.64	5071.78	4609.36	5090.28
Agricultural	0	10.98		0	0	0	0	0	0	0
Barren Lands	0	7.78		0	0	0	0	2.22	0	1.56
Lower Montain	1.6	18.68		0	0	0	0	0	0	0
Pinion Juniper Woodland	11.05	580.15	27.52	12	0	5.39	270.16	1.33	94.83	59.68
Xeric Sage Shrubland	162.52	0	436.76	129.47	1.19	52.97	1464.92	242.76	1015.66	610.22
Big Sage Shrubland	229.5	2.98	1468.08	8.46	36.34	287.63	2597.78	3191	1283.71	1692.11
Big Sage Steppe	0	2.98	77.39	94.25	21.52	48.98	0	0	0	0
Cliff and Canyon	15.31	0	0	0	0	0	0	0	0	0
Greasewood Flat	149.34	885.06	67.44	94.24	21.53	48.98	26.29	15.12	131.68	156.06
Mixed Salt Desert Scrub	32.46	327.17	0	0	0	0	774.33	1652.98	2073.84	2552.06
Montane Sage Steppe	0	19.95	0	0	0	0	0	0	0	0
Playa	14.05	6.15	7.11	44.32	0	7.64	0	0	6.67	28.91
Semi-Desert Grassland	0	83.12	9.4	22.92	13.48	13.71	0	0	18.92	0
Wash	0	8.9	0	0.9	0	0	1.11	0	0	1.33
Invasive Annual Grassland	6.89	225.98	0	14.23	5.64	40.48	5.49	0	0	0.74
Invasive Biannual Forbland	1.78	0	0	0	0	2.45	9.69	0	0	0
Emergent Marsh	0	81.09	0	0	0	0	0	0	0	0

Parcel # NV-08-07-065 (Beowawe area)

Antelope summer and crucial winter habitats exist in and near the lease area (**Map 2**). Seasonal restrictions from disturbance in crucial antelope yearlong ranges (including winter) apply during the period 11/15-3/16, inclusive. There is no specified mule deer habitat within or near the parcel boundary though a few individuals may utilize the area periodically. Raptor nesting sites have been documented near parcel #NV-08-07-065, but not within the parcel boundary. Parcel NV-08-07-065 is in the vicinity of winter sage grouse habitat. Impacts include temporary individual or population displacement from preferred to marginal habitat, potential for animal mortality or behavioral changes in the vicinity of the leasing activity site, and/or permanent habitat loss due to mechanical changes to the environment or weed invasion. Geothermal development could adversely impact habitat for 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 thermal cover success. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

Parcel # NV-08-07-069 (Ruby Valley area)
Mule deer summer and intermediate habitat exists in and near parcel NV-08-07-069 (**Map 3a**). Antelope utilize the area on a sporadic basis throughout the year, with concentrations never getting very high. Big horn sheep occupy the Ruby Mountain Range to the West of the proposed action area. Impacts include temporary individual or population displacement from preferred to marginal habitat, potential for animal mortality or behavioral changes in the vicinity of the exploration site, and/or permanent habitat loss due to mechanical changes to the environment, weed invasion or restriction/closure of seasonal movement to and from crucial habitat. Operational restrictions, especially on use in crucial habitats, would be necessary when proposals for leasing activities are submitted.

Raptor foraging areas encompass parcel #NV-08-07-069, but no nests have been documented within or near the parcel boundary. Raptor, migratory and sensitive bird nesting surveys would be conducted prior to any disturbance activities. Geothermal development could adversely impact breeding, nesting, brood-rearing, crucial winter and summer habitat for sage grouse by removal of vegetation and destruction of areas during construction. Parcel #NV-08-07-069 is within all of the above-mentioned habitats (**Map 3b)**. Indirect effects are largely attributed to increased human activity, which could displace individuals or reduce nesting success. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

Parcel #s NV-08-07-070, 071, 072, 073 (Marys River, north of Deeth)
Mule deer crucial summer habitat and intermediate habitat exist in these parcel areas, and some of the habitat in parcels NV-08-07-071, 72 and 73 were burned by the 2006 Charleston and Gopher fires. Seasonal restrictions from disturbance in crucial summer deer ranges apply during the period 5/15-7/15, inclusive. Antelope crucial winter also intersects parcels #s NV-08-07-070, -071 and -072 (**Map 4a**). Seasonal restrictions from disturbance in crucial antelope yearlong ranges (including winter) apply during the period 11/15-3/16, inclusive. Raptor nesting sites and foraging areas have been documented within the vicinity of the parcels. Impacts include temporary individual or population displacement from preferred to marginal habitat, potential for animal mortality or behavioral changes in the vicinity of the exploration site, and/or permanent habitat loss due to mechanical changes to the environment or weed invasion. Restrictions, especially on use in crucial habitat, would be determined when a proposal is submitted.

Parcel #s NV-08-07-074, 075, 076 and 077 (Ruby and Butte Valleys area)

Antelope crucial winter habitat and mule deer intermediate habitat and migration routes exist in and near these parcel areas (**Map 3a**). Impacts include temporary individual or population displacement from preferred to marginal habitat, potential for animal mortality or behavioral changes in the vicinity of the exploration site, and/or permanent habitat loss due to mechanical changes to the environment, weed invasion or restriction/closure of seasonal movement to and from crucial habitat. Operational restrictions, especially on use in crucial habitats, would be necessary when proposals are submitted. Raptor nesting sites and foraging areas have been

documented within the vicinity of the parcels. Nesting surveys would be conducted prior to any disturbance activities. Parcel NV-08-07-075 is within sage grouse crucial winter habitat while parcels NV-08-07-074 and 076 are within nesting/brood rearing habitats (**Map 3b**). Geothermal development could adversely impact breeding, nesting, brood-rearing, crucial winter and summer 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. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

3.2.19 Migratory Birds

Existing Conditions

According to the Elko District Bird List, there are approximately 246 species that could inhabit the Field Office area of jurisdiction on a seasonal or yearlong basis (BLM, 1999). The Proposed Action area includes habitat for all of these migratory bird species on a seasonal or yearlong basis. On January 11, 2001, President Clinton signed the Migratory Bird Executive Order 13186 titled "Responsibilities of Federal Agencies to Protect Migratory Birds". It directs executive departments and agencies to take certain actions to further implement the Migratory Bird Treaty Act and to conserve migratory birds. The species shown in the following table are "priority" migratory bird species that may occur in the habitat types on Elko District lands.

Table 3.10: Migratory Birds by Habitat Type

	Agricultural	Cliffs and Talus	Lowland Riparian	Montane Riparian	Montane Shrub	Pinion Juniper	Sage	Salt Desert Scrub	Wetlands and Lakes
American Avocet									X
American White Pelican									X
Ash-throated Flycatcher			X						
Bank Swallow			X						
Black Rosy Finch		X			X		X		
Black Tern									X
Black Throated Gray Warbler						X			
Blue Grosbeak			X						
Bobolink	X								
Burrowing Owl					X		X	X	
Calliope Hummingbird				X	X		X		
Clark's Grebe									X
Cooper's Hawk				X			X		
Ferruginous Hawk	X	X					X		
Gray Flycatcher						X	X		
Gray Vireo						X			
Greater Sandhill Crane	X								X
Juniper Titmouse						X			

	Agricultural	Cliffs and Talus	Lowland Riparian	Montane Riparian	Montane Shrub	Pinion Juniper	Sage	Salt Desert Scrub	Wetlands and Lakes
Lewis' Woodpecker				X			X	X	
Loggerhead Shrike					X		X	X	
Long-billed Curlew	X								X
Lucy's Warbler								X	
MacGillivray's Warbler				X					
Orange-crowned									X
Phainopepla								X	
Pinion Jay						X			
Prairie Falcon	X	X					X		
Red-naped Sapsucker							X		X
Sage Grouse							X		
Sage Sparrow							X		
Sage Thrasher							X		
Scott's Oriole						X			
Short-eared Owl					X				X
Snowy Plover									X
Southwestern Willow Flycatcher			X						
Swainson's Hawk	X				X		X		
Vesper Sparrow							X		
Virginia's Warbler			X						
Western Bluebird						X		X	
Western Yellow-billed Cuckoo			X						
White-faced Ibis	X								X
Willow Fly Catcher				X					
Wilsons Warbler				X					
Yellow Billed Cuckoo			X	X					
Yellow-breasted Chat			X						X

Source: 1999 Nevada Partners in Flight Bird Conservation Plan

Effects of Leasing Activities

Initial leasing of geothermal parcels would not have a direct effect on migratory birds, but initial surface disturbing activities of geothermal exploration and facility construction of lease parcels have a probability of occurring within the vicinity of resident bird populations. Impacts include temporary individual or population displacement from preferred to marginal habitat and potential for animal mortality or behavioral changes in the vicinity of the exploration/construction site due to either interaction with construction activity or by being unable to adapt to new habitat conditions. Mortality could also occur to individuals or populations in areas adjacent to the construction site due to the influx of animals into those areas. Other impacts include habitat loss of the area surrounding the drilling site due to fencing and other mechanical changes to the environment, noise, high activity levels or weed invasion. Though some individual animals

would become accustomed to the workings of the facility and return to utilize habitat within close proximity to it, most would be permanently displaced either due to mortality or behavioral changes.

Initial reclamation activities would continue to keep many birds from utilizing the site area until completion. After all activity ceases, individuals birds and populations would likely return to the area. It is possibly that migratory bird numbers could increase, if successful reclamation expands the diversity of habitat types.

3.2.20 Special Status Species

Special status species include Federal and State threatened, endangered, candidate and sensitive species. Any action that may affect a species that is Federally-listed as threatened or endangered (T/E) is subject to consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to Section 7 of the Endangered Species Act of 1973 (ESA). BLM 'confers' with FWS for species that are proposed for listing. BLM policy (BLM Manual Handbook H-6840.02 B) is to ensure actions would not contribute to listing any of species under the ESA that have been petitioned for listing under the ESA (candidates), are state listed, or that BLM has designated as sensitive (BLM-sensitive). Thus, BLM would not authorize actions that could adversely affect their populations. The most recent list of Nevada BLM-sensitive species was issued July 29, 2003. Information on the occurrence and trends of species and their habitats is an ongoing process.

Geothermal exploration and development activities could affect special status species in a variety of ways. Potential impacts are summarized below, but a more thorough survey and analysis of how each species would be affected would be conducted when site-specific exploration permits are prepared for development of each lease. Environmental impacts of geothermal resource development are similar to other activities that affect terrestrial and aquatic species and habitats. While each species would respond differently to various impacts, all species could be affected by activities that alter thermal, physical, or chemical characteristics of aquatic and terrestrial habitats. Stipulations are in place to prevent or minimize adverse effects to special status species that must be complied with as a term of lease purchase.

Special Status Plants

Existing Conditions

The following table lists the special status plant species that may occur in the nominated lease sale parcels. The Sulfur Springs buckwheat, Lamoille Canyon milkvetch and the Elko witlowcress have been documented on the eastern foothills of the Ruby Mountains and within the Ruby Valley and as such could be present in parcel # **NV-08-07-069** and possibly within distance of operational air emissions from geothermal facilities.

Table 3-11: Potential Occurrence of Special Status Plants by Parcel

Special Status Plants		65	69	70	71	72	73	74	75	76	77
Sulfur springs buckwheat	*Eriogonum argophyllum*		*x*								
Lamoille Canyon milkvetch	*Astragalus bobbinsii*		*x*								
Elko witlowcress	*Draba sphaeroidus*		*x*								

Special Status Invertebrates

Existing Conditions

The *Gray's silverspot butterfly* and the *Nevada viceroy* have been identified with intact Basin Big sagebrush communities, and as such could be associated with all of the nominated parcels.

The *Nevada water mite* and the *Humboldt pryg* have been documented in spring sources in the vicinity of parcel #s **NV-08-07-070, 071, 072 and 073**.

Table 3-12: Potential Occurrence of Special Status Invertebrates by Parcel

Invertebrates		**65**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**
Grey's silverspot butterfly	*Speyeria atlantis greyi*	***X***	***X***	***X***	***X***	***X***	***X***	***X***	***X***	***X***	X
Nevada viceroy	*Limenitus archippus lahontani*	***X***	***X***	***X***	***X***	***X***	***X***	***X***	***X***	***X***	X
Nevada water mite	*Thermacarus nevadensis*			***X***	***X***	***X***	***X***	***X***	***X***	***X***	X
Humboldt pryg	*Pyrgulopsis humbodtensis*			***X***	***X***	***X***	***X***				

Special Status Aquatic Species

Existing Conditions

The Lahontan cutthroat trout (LCT) (federally listed threatened) has been documented in a number of streams through out the Elko district. LCT occurs in eight major sub basins: North Fork Humboldt River, South Fork Humboldt River, East Humboldt River, South Fork Little Humboldt River, Maggie Creek, Marys River, Pine Creek, and Rock Creek. Populations are generally low and most occupied stream reaches occur in less accessible headwaters. The Fish and Wildlife Service (FWS) designated LCT as a threatened species because populations throughout much of its native range have been eliminated. Reasons for this decline include alteration of stream channel and riparian habitats; water diversions that reduce stream flow, impaired water quality in lower river reaches; dams and other obstructions to migration; and, the introduction of non-native game fishes and other competitive animals. Substantial efforts to improve the fisheries and increase the number of water bodies maintaining reproducing LCT populations have been undertaken in the Elko District by the FWS, NDOW, and BLM.

The Columbia spotted frog (federally listed candidate) has been documented over a good portion of the Elko District. It is one of the four true frogs native to Nevada and is closely associated with slow moving or ponded surface waters with little shade. Reproducing populations are found in habitats characterized by springs, floating vegetation and larger bodies of pooled water (lakes, stock-ponds, beaver ponds, backwaters) (Draft Conservation Agreement and Conservation Strategy, Columbia Spotted Frog (Rana luteiventris), Great Basin Population, Nevada, 1999). A deep silt or muck substrate would be required for hibernation and torpor. Females would lay only one egg mass per year; yearly fluctuations in the sizes of egg masses are extreme (Draft Conservation Agreement and Conservation Strategy, Columbia Spotted Frog (Rana luteiventris), Great Basin Population, Nevada, 1999). Successful egg production and the viability and metamorphosis of spotted frogs are susceptible to habitat variables such as temperature, depth and pH of water, cover and presence/absence of predators (fish, bullfrogs) (Draft Conservation Agreement and Conservation Strategy, Columbia Spotted Frog (Rana luteiventris), Great Basin Population, Nevada, 1999).

Relic Dace is a BLM-sensitive non-game, native fish known to occur in springs throughout Butte Valley, one of which is just outside the boundary of parcel # **NV-08-07-076**.

Geothermal development could affect aquatic and wetland special status species. A site-specific analysis of how each species would be affected would be conducted when exploration and development proposals are submitted for a lease. The following table summarizes what is known regarding the occurrence of aquatic and wetland special status species in the vicinity of the currently nominated parcels.

Table 3-13: Potential Occurrence of Special Status Aquatic Species by Parcel

Special Status Species	***Scientific Name***	**Parcel(s) Where Species Likely to Occur**									
Fish		**65**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**
Lahontan cutthroat trout (**Threatened**)	*Oncorhynchus clarki henshawi*			**X**	**X**	**X**					
Relic Dace	*Relicius solitaries*							**X**	**X**	**X**	**X**
Amphibians											
Columbia Spotted Frog **(Candidate)**	*Oncorhynchus clarki henshawi*			**X**	**X**	**X**					

Effects of Leasing Activities

While species would respond differently to various impacts, all species could be affected by activities that alter thermal, physical, or chemical characteristics of aquatic habitats. The stipulation to prevent or minimize adverse effects to all special status species must be complied with as a term of lease purchase.

Lahontan cutthroad trout are known to inhabit the waters of the Marys River (**NV-08-07-070, 71 and 72)**, so BLM would be required to consult with the FWS when future development is proposed that may affect this threatened species. Spotted frogs have been identified in the Marys River and springs west of the river.

For the Butte Valley parcel # **NV-08-07-076,** application of the special status species stipulation for relic dace could apply. Relic dace have been identified in springs throughout Butte Valley, one of which is just outside the boundary of **NV-08-076**.

Special Status Avian Species of High Interest

Bald eagles (BLM sensitive) forage throughout the winter months over the whole range of the Elko District. Bald eagles usually winter near unfrozen bodies of water because fish and waterfowl are common prey and riparian areas often have suitable trees for perches. Eagles are also known to roost in juniper trees (Bradley 2005). They move to upland sites to forage for small mammals or to feed on carrion. The National Triennial Midwinter Bald Eagle Count conducted by the Nevada Department of Wildlife documented 18 eagles in January 2007, 26 in January 2004; and 42 in 2001. This is downward trend. (NDOW, 2007).

Golden eagles (BLM sensitive) are year round residents that forage and nest over the whole range of the Elko District. Golden Eagles inhabit open grassland habitats (Kochert et al. 2002). Golden Eagles use a variety of nesting substrates. Substrates must be large enough to support the

eagles' bulky nests. Golden Eagles also use roosting locations near their nests; hence, additional ledges and perch sites are beneficial to breeding eagles (Collopy and Edwards 1989). Golden Eagles usually nest on cliffs but also use large trees, artificial structures, or the ground, depending in part upon availability. Golden Eagles prey primarily on mammals, although birds, reptiles, fish, and carrion also are eaten (Bent 1961, Olendorff 1976, Brown 1992, Watson et al. 1992, Kochert et al. 2002). A wider variety of prey types are taken when primary prey becomes less abundant (Steenhof and Kochert 1988). Prey abundance influences reproduction in Golden Eagles. Abundance of prey during the winter was positively correlated with several reproductive parameters during the following breeding season including the percentage of pairs laying eggs, the percentage of laying pairs that were successful, brood size at fledging, and number fledged per occupied territory. Golden Eagles have large home ranges that are defended, particularly during the breeding season. Home range size would increase or decrease during the non-breeding season. Eagles defend their home ranges or territories during the breeding season and are more tolerant of other eagles during the non-breeding season (Kochert et al. 2002).

There is a single confirmed documentation of the *Yellow Billed Cuckoo* (Federally listed candidate) in the southwest portion of Elko County. This species is specialized and lives only in mature riparian forests and has been petitioned to be listed as an endangered species. They feed primarily on insects.

The greater sage grouse (BLM sensitive) population is estimated to be 45,100 birds for the Elko District as of December 2003 (Elko County Sagebrush Ecosystem Conservation Strategy). There are approximately 900 strutting grounds or leks on BLM administered lands. The leks are traditional breeding areas where males congregate to display each spring. Nesting is concentrated in suitable habitats within a 2 miles radius of the leks. Brood rearing habitats consist of upland sagebrush areas adjacent to riparian meadows. The leks, nesting, and brood rearing habitats are limited in extent and the behavioral activities associated with these habitats are easily disrupted either by disturbance to the habitat or by activities that displace the birds from these important habitats. A variety of habitats, consisting of sagebrush stands of different height, density, and species, are used in winter depending on climatic conditions and forage availability and quality. These habitats are usually more extensive in area than the other seasonal habitats

Except for the Beowawe parcel (69), all of the parcels proposed for the leasing sale are known to have lek areas in their boundaries and/or are within the vicinity of sage grouse summer, winter and nesting/brood rearing habitat (**Maps 3b and 4b**).

Special Status Mammals

The Preble's shrew (BLM-sensitive species) is known to inhabit portions of the Elko District. This species occupies primarily in streamside sagebrush, rabbitbrush, bitterbrush, bunchgrass and forbs; willow and greasewood meadows, and sagebrush, aspen and willow riparian habitat. They feed primarily on insects and other small invertebrates.

Pygmy rabbit (BLM-sensitive species) have been documented throughout the Elko District. Pygmy rabbits are usually found in areas of deep, friable soils that are suitable for creating their burrow system. These sites generally support basin big sagebrush and would be associated with meadows or former meadows. Stands of Wyoming big sagebrush are also utilized, again often in proximity of riparian areas. Pygmy rabbits dig their own burrows and are usually found close to

their burrow systems. Their primary food source is sagebrush, particularly in the winter. Grasses are more important in the summer.

Numerous bat species occur throughout the Elko District. Suitable habitat would include rock crevices on steep cliff faces, springs, canyons, coniferous forests (including juniper), and deciduous forests. Roosting could occur in caves or mine shafts/adits. In general, bats use water between night-time foraging bouts. They utilize the habitat types mentioned above for foraging and feed on a variety of nocturnal insects. Many bat species within the district are migratory; while others, like the Townsend's big-eared bat occupy yearlong or winter roost sites within the area of the proposed leases.

Effects of Leasing Activities

Sites would be surveyed, and any site occupied by special status plant, invertebrate, aquatic or terrestrial species by drilling and ground disturbing exploration or development activities would be avoided or otherwise mitigated.

Initial leasing of geothermal parcels would not have a direct effect on special status wildlife species, but post-leasing surface disturbing activities of geothermal exploration and facility construction of lease parcels would occur within the vicinity of resident special status species populations. The environmental impacts on habitat for species of concern are expected to be restricted to small geographical areas during the life of a geothermal operation. BLM's implementation of lease stipulations and terms and conditions of approvals for future operations is expected to mitigate impacts caused by proposed activities. Such impacts include displacement, destruction or modification of habitat, or changes in population distribution and abundance, particularly in species with restricted distribution and specific habitat requirements. In most cases, drilling activities would not be allowed in areas where such activities could have an adverse impact. The BLM would require modifications to a proposal to avoid effects likely to contribute to listing of a candidate or sensitive species, or threaten the continued existence of a species that is listed or proposed for listing.

Impacts to special status animal species include temporary individual or population displacement from preferred habitat, and potential for animal mortality or behavioral changes in the vicinity of the drilling site due to either interaction with construction activity or by being unable to adapt to new habitat conditions. Mortality could also take place to individuals or populations in areas adjacent to the drilling site due to the influx of animals into those areas. Though some individual animals would become accustomed to the workings of the facility and return to utilize habitat within close proximity to it, others could be permanently displaced either due to mortality or behavioral changes. The most significant impacts to special status species include disturbance of soils and vegetation communities that could be difficult to rehabilitate, and alteration of groundwater resources that could alter spring and stream discharge. Other impacts include habitat loss due to mechanical changes to the environment, fencing, noise, high activity levels or weed invasion.

Parcel # NV-08-07-065 (Beowawe)

No sage grouse habitat occurs in the area of parcel # **NV-08-07-065.** Bald eagles inhabit the district and potentially the designated geothermal zones during the winter months (Oct- Apr). Site development near bald eagle roosts would most likely cause the eagles to abandon the roosts

due to increased stress of persistent human activity and noise levels. Other suitable roosting sites would or would not be present is the same general area. Burrowing owls occupy drier grassland and sagebrush habitats, they nest in underground burrows often excavated by ground squirrels, badgers and other mammals. Burrowing owls, preble's shrews and pygmy rabbits would inhabit the intact sagebrush communities along the drainage corridors that run through parcel **# NV-08-07-065**. Though no surveys have been conducted, numerous bat species could utilize the outbuildings of nearby ranches or old mining facilities and the canyon areas of the northern slopes of the Shoshone Range as roosting habitat. Riparian areas associated with the steam drainages, the large spring complexes to the west of the parcel area and agricultural practices would provide foraging habitat for these species. Ferruginous hawks and Golden eagles could have roosting and nesting habitat in the cliff faces of the Shoshone Range and Malpais that overlook the nearby Whirlwind Valley. The large riparian areas associated with Hot Springs and Geyser Complexes to the west would make ideal foraging habitat for these species. The wet meadow riparian areas and the riparian zones along the perennial sections of the area drainages could attract wading avian species such as the white-faced ibis and the sandhill crane, as such they could also be present in parcel # **NV-08-07-065**. The Nevada Viceroy and Grey's silverspot butterfly has been identified in the Beowawe area and as such could be present in parcel # **NV-08-07-065**.

Parcel # NV-08-07-069 (Ruby Valley)

Sage grouse summer, crucial winter and nesting/brood-rearing habitats occur in the area of parcel # **NV-08-07-069** (**Map 3b**). Bald eagles inhabit the district and potentially the designated geothermal zones during the winter months (Oct- Apr). Site development near bald eagle roosts would most likely cause the eagles to abandon the roosts due to increased stress of persistent human activity and noise levels. Other suitable roosting sites would or would not be present is the same general area. Burrowing owls occupy drier grassland and sagebrush habitats, they nest in underground burrows often excavated by ground squirrels, badgers and other mammals. Burrowing owls, Preble's shrews and pygmy rabbits would inhabit the intact sagebrush communities along the drainage corridors that run through parcel # **NV-08-07-069**. Though no surveys have been conducted, numerous bat species, Ferruginous hawks, Golden eagles, and Northern goshawks could utilize the ridges of the nearby Ruby Mountains. The grassland and marsh areas in and surrounding the parcel could attract wading avian species such as the white-faced ibis and the Least bittern, as such they could also be present in parcel # **NV-08-07-069**. Though no surveys have been conducted, numerous bat species could utilize the outbuildings of nearby ranches and the canyon areas of the eastern slopes of the Ruby Mountains as roosting habitat. Riparian areas associated with the stream drainages, springs and agricultural practices would provide foraging habitat for these species. The Sulfur Springs buckwheat, Lamoille Canyon milkvetch and the Elko witlowcress have been documented on the eastern foothills of the Ruby Mountains and within the Ruby Valley and as such could be present in parcel # **NV-08-07-069** and possibly within distance of operational air emissions from geothermal facilities.

Parcel #s NV-08-07-070, 071, 072, 073 (Mary River)

Lahontan cutthroat trout are known to inhabit the waters of the Marys River, and so BLM would be required to consult with the U. S. FWS when future development is proposed that may affect this threatened species in any of the parcels. Spotted frogs have been identified in the Marys River and springs west of the river. Sage grouse lek areas and summer, winter and nesting/brood rearing habitats occur in areas of parcel #s **NV-08-07-070, 071, 072, 073** (**Map 4b**), though no crucial habitat is present. Sharp-tailed grouse have been reintroduce to the southern portions if

Idaho and have been documented migrating south into Nevada. The latest reports state that sighting have occurs south into the Snake Range and therefore individuals could be present in the vicinity of all four parcels. Bald eagles inhabit the district and potentially the designated geothermal zones during the winter months (Oct- Apr). Site development near bald eagle roosts would likely cause the eagles to abandon the roosts due to increased stress of persistent human activity and noise levels. Other suitable roosting sites would or would not be present is the same general area. Burrowing owls occupy drier grassland and sagebrush habitats, they nest in underground burrows often excavated by ground squirrels, badgers and other mammals. Burrowing owls, Preble's shrews and pygmy rabbits would inhabit the intact sagebrush communities along the drainage corridors that run through parcel #s **NV-08-07-070, 071, 072, 073**. Pygmy rabbits have the probability of inhabiting areas were the pinyon/juniper zones phase into the big sage shrublands. Although no surveys for bats have been conducted, bat species could be utilizing roost and foraging habitat within the rocky outcrops and cliffs of the Mary River drainage and surrounding terrain. The Nevada water mite and the Humboldt pryg have been documented in spring sources in the vicinity of parcel #s **NV-08-07-070, 071, 072, 073**.

Parcel #s NV-08-07-074, 075, 076, 077 (Ruby and Butte Valleys)
Sage grouse summer, crucial winter and nesting/brood rearing habitats occur in the area of parcels # **NV-08-07-074, 075, 076, 077** (**Map 3b**). Relic dace have been identified in springs throughout Butte Valley, one of which is just outside the boundary of parcel 076. Bald eagles inhabit the district and potentially the designated geothermal zones during the winter months (Oct- Apr). Site development near bald eagle roosts would most likely cause the eagles to abandon the roosts due to increased stress of persistent human activity and noise levels. Other suitable roosting sites would or would not be present is the same general area. Burrowing owls occupy drier grassland and sagebrush habitats, they nest in underground burrows often excavated by ground squirrels, badgers and other mammals. Burrowing owls, Preble's shrews and pygmy rabbits would inhabit the intact sagebrush communities along the drainage corridors that run through parcel #s **NV-08-07-074, 075, 076, 077**. Pygmy rabbits have the probability of inhabiting areas were the pinyon/juniper zones phase into the big sage shrublands. Though no surveys have been conducted, numerous bat species could utilize the outbuildings of nearby ranches and the canyon areas of the surrounding slopes of the Cherry Creek Range, the West Buttes and the Delcer Buttes as roosting habitat. Riparian areas associated with the stream drainages, springs and agricultural practices would provide foraging habitat for these species. Ferruginous hawks, Golden eagles and Northern goshawks could have roosting and nesting habitat in the cliff faces that overlook the Butte and Ruby valleys. The Gray's silverspot butterfly and the Nevada viceroy have been identified with intact Basin Big sagebrush and as such could be associated with parcel #s **NV-08-07-074, 075, 076, 077**.

All geothermal lease parcels have known special status species habitat and, as such, are subject to restrictive and seasonal protection from disturbance (OG-010-05-01). Application of the stipulations for sensitive raptors (OG-010-05-02) and sage grouse (OG-010-05-07, -08 and -09), as shown in **Table 2-2** in this EA, is expected to mitigate adverse impacts from future leasing activities for the proposed parcels.

3.3 CUMULATIVE IMPACTS FROM OTHER ACTIVITIES

As noted for the analysis of effects of leasing activities for each of the resource issues in the previous section, there would be no impacts from the initial action of geothermal leasing. However, cumulative impacts on affected resources and uses could result from any future exploration, development, production, and abandonment of leased parcels (**Appendix A, Reasonably Foreseeable Development Scenario**), in combination with other activities as summarized in the introduction to this chapter.

Geologic and Socio-Economic Resources
Since 2003, BLM Nevada has received 17 applications for geothermal leasing in the Elko District for a total of 21,765 acres, and issued leases for all but one pending case for 440 acres. All of the currently proposed lease parcels consist of 30,612 acres that would be open to some potential ground disturbance. Based on past data, geothermal development footprints could be forty acres per well. The significance of development of a large number of leases, especially in the same geographical area, would be evaluated when plans are submitted.

Other activities that could interact with geologic resources and economic expansion from geothermal leasing activities to increase pressure on resources and demands on services include but would not be limited to mining, other energy related development (oil and gas, wind) and recreation. Impacts from such activities are expected to increase in the foreseeable future, and would be considered when exploration or development plans are submitted to BLM for approval.

Cultural Resources, Paleontological Resources and Native American Concerns
In general, impacts from leasing activities could include disturbance and potential loss of cultural and paleontological resources, including ethnographic resources and uses of concern to Native Americans. If development reaches a "trigger" level of four or more wells in a 640-acre area, or if the area is particularly sensitive for cultural resources, then block archaeological inventory or other special studies would help BLM and the proponent develop a cultural resources plan to mitigate adverse impacts to cultural resources in the area in consultation with the State Historic Preservation Officer and affected tribes.

Most cultural properties tend to degrade over time due to natural forces but many survive for thousands of years. Modern human activity tends to exacerbate the damage and as a consequence cultural resources are disappearing at an ever increasing rate. Many of the impacts of fluid mineral exploration and development would be mitigated through implementing protective measures as part of standard operating procedures. Similar measures would be implemented for other types of federal undertakings would also limit cultural resource impacts. Nonetheless, as described above, not all damages attributable to these actions are well understood or could be controlled. Taken together with other uses of the public lands, geothermal exploration and development would cumulatively contribute to an overall decline in cultural resources. The Cultural Resources and Native American Consultation stipulation (OG010-05-03) advises potential lessees that the National Historic Preservation Act and other statutes and executive orders requires that BLM provide affected tribes an opportunity to comment and consult on proposed actions, which includes concerns for cumulative effects of other related actions. BLM would attempt to mitigate impacts to Native American traditional, cultural and/or spiritual sites, activities, and resources.

Soil, Water and Air Resources
Cumulative impacts to soils, water and air would result from geothermal leasing as well as a variety of other land uses as outlined in resource management plans. Activities that affect the quality of these resources on public lands include but would not be limited to mining, grazing, and recreation. Impacts from all of these uses would be expected to increase in intensity for the foreseeable future, and would be considered when exploration or development plans are submitted to BLM for approval.

Vegetation, Grazing and Invasive, Non-Native Species
All leasing activities likely occur in allotments where livestock use is permitted. Impacts to vegetation as a result of other past, present and reasonably foreseeable future actions, including grazing, would be considered on a case-by-case basis as exploration and development activities are proposed. Exploration and development activities could also increase the spread of invasive, nonnative species and add to the long list of activities that have adversely affected aquatic and terrestrial wildlife habitat and conflict with use of habitat by big game and sensitive wildlife species such as sage grouse.

Forest Resources
Activities that could interact with geothermal leasing activities to cumulatively affect forest resources include but would not be limited to mining, grazing, and recreation. Impacts from all of these activities would be expected to increase in the foreseeable future, and would be considered when exploration or development plans are submitted to BLM for approval.

Recreation and Visual Resources
Future lease activities could affect recreational access or a cause a decrease in the number of recreational sites or the quality of recreational experiences near disturbed areas. Surface development structures such as drill rigs and well buildings would add to the visual resource impacts of the leased area until eventual abandonment and removal.

Wetlands and Riparian Resources
The potential for cumulative impacts from other past, present and reasonably foreseeable future activities on wetlands and riparian resources would be identified on a case-by-case basis when post-leasing exploration and development activities are proposed.

There are no spring sources located within the boundary of parcel #NV-08-07-065. There is no data on the functioning condition of the over 21 perennial spring habitats within the vicinity of this parcel. Habitat conditions for streams on lands in the area are highly variable and depend largely on management initiatives. There are both intermittent and perennial (Coyote Creek and the Humboldt River) streams in the cumulative effects area. Neither perennial stream has been rated for functionality.

No functionality data is available for 11 perennial spring habitats in the vicinity of the Marys River parcel #s NV-08-07-070, 71, 72 and 73. Spring riparian areas are highly important for wildlife use. Habitat conditions for streams on lands in the cumulative effects area are highly variable and depend largely on management initiatives. The streams in the vicinity of the parcels are all intermittent except for Marys River, which has fenced exclosures resulting in improved habitat condition trends in limited areas. There are 17 perennial spring habitats within the

vicinity of parcel #s NV-08-07-074, 075, 076, and 077. Habitat conditions for streams on lands in the cumulative effects area are highly variable and depend largely on management initiatives. The streams in the vicinity of the parcels are all intermittent. The cumulative impacts of lease development on aquatic and terrestrial wildlife, including big game species, migratory birds and special status species and their habitats could have undesirable effects, depending on other land use activities within the area.

Fisheries

As for wetland and riparian resources, the potential for cumulative impacts from other past, present and reasonably foreseeable future activities on fisheries would be considered on a case-by-case basis when post-leasing exploration and development activities are proposed.

Wildlife, Migratory Birds and Special Status Species

Depending on the amount of activity and the scope of the vegetation lost due to drill pads and ancillary facilities, some wildlife habitat and forage could be lost. However, site-specific mitigation measures developed at the time of submission of an exploration or development proposal should serve to avoid or minimize potential impacts related to the reasonably foreseeable future development.

The significance of development of other leases in the same geographical area of a given parcel would be evaluated at the time activities are proposed for a given parcel. Based on past data, geothermal development footprints could be forty acres per well. The cumulative impacts of lease development on wildlife, including big game species, migratory birds, fisheries, special status species and their habitats could have undesirable effects, depending on other land use activities within area. Any measurable modification of species behavior or habitat loss would be dependant upon the extent to which the area has already been affected by other land use activities; this would be evaluated by additional environmental review prior to approval of any proposal.

Positive cumulative impacts are expected to result from the Great Basin Restoration Initiative and on going stream/riparian and upland restoration projects and fire rehabilitation treatments. Land uses that could have negative cumulative impacts to riparian, fisheries, wildlife, migratory birds and special status species include livestock grazing, recreation, urban development and mining activities. Not all land uses would be present at the proposed development site and/or would occur seasonally.

Parcel # NV-08-07-065 in the Beowawe area consists of 1,267.8 acres open to some potential ground disturbance. This parcel is in the vicinity of intense grazing operations, and is near areas burned by the1999 Frenchi and the 2007 Sansinina fires. Seeding and plantings were completed over areas of these fires as part of rehabilitation measures.

Parcel # NV-08-07-069 constitutes 2,240 acres open to some potential ground disturbance. The parcel is just north of the Ruby Lake National Wildlife Reserve and is near the foothills of the Ruby Mountains. Both of these areas are high in recreational use, but the parcel sits within the Ruby Valley where recreational activities are limited due to the abundance of private land. A decision to not lease a 40-acre parcel in Ruby Valley due to Native American concerns has been pending since 2006, and BLM prefers leasing of this currently nominated parcel be deferred until studies pertinent are completed and consultation continues with affected tribes. Livestock

grazing occurs in the surrounding pastures of the Ruby 6 Allotment and the West Gardner FFR Allotment. No fire disturbance has been recorded for the parcel vicinity since before 1998.

Marys River parcel #s NV-08-07-070, 71, 72, and 73 constitute 7,236.9 acres open to some potential ground disturbance. Positive cumulative impacts are expected to result from the Great Basin Restorative Initiative, the Marys River Restoration Plan and on going stream/riparian and upland restoration. Land uses that could have negative cumulative impacts to riparian, fisheries, wildlife, migratory birds and special status species include livestock grazing, recreation, fire, urban development and mining activities. Not all land uses occur in the proposed parcels and/or would occur seasonally. Parcels # NV -08-07-070, 71, 72, and 73 occur within the vicinity of grazing operations in the Deeth, West Side and Black Butte Allotments. Many areas along the Marys River have been closed to grazing and there is a riparian pasture situated in the area of parcels NV-08-07-070 and 73 where no grazing has been allowed for a number of years. Parcels NV-08-07-071, 72 and 73 are also in areas impacted by the 2006 Charleston and Gopher fires. Seeding and plantings were completed over areas of these fires as part of rehabilitation measures. Aerial seeding of native vegetation and other vegetation treatments were also conducted in the area of the parcels in accordance with fire prevention measures.

Parcel #s NV-08-07-074, 075, 076 and 077 in the Ruby and Butte Valley area constitute 19,867.1 acres open to some potential ground disturbance. They are within the vicinity of intense grazing operations in the Valley Mountain and North Butte Valley Allotments. The Odgers Shoshone Reservation operations occur to the south of the parcels. The area is utilized for hunting and ATV recreational activities, especially in the fall. Mining activities are increasing in the area with recent exploration activity occurring in the Maverick/Medicine range to the southwest of the parcels. Any measurable modification of species behavior or habitat loss would be dependent upon the extent to which the area has already been affected by other land use activities.

Antelope crucial winter habitat and mule deer intermediate habitat and migration routes exist in and near these parcels (**Map 3a**). Raptor nesting sites and foraging areas have been documented within the vicinity of the parcels. Impacts include temporary individual or population displacement from preferred to marginal habitat, potential for animal mortality or behavioral changes in the vicinity of the exploration site, and/or permanent habitat loss due to mechanical changes to the environment, weed invasion or restriction/closure of seasonal movement to and from crucial habitat.

Except for the Beowawe parcel (69), all of the parcels proposed for the lease sale are known to have lek areas in or near their boundaries and/or are within sage grouse summer, winter and nesting/brood rearing habitat (**Maps 3b and 4b**). **Parcel NV-08-07-075** is within sage grouse crucial winter habitat while parcels NV-08-07-074 and 076 are within nesting/brood rearing habitats (**Map 3b**). Cumulative effects are largely attributed to increased access and human activity, which could displace individuals, reduce nesting success and provide for additional legal and illegal take. Geothermal development could cumulatively adversely impact breeding, nesting, brood-rearing, winter and summer habitat for sage grouse by removal of vegetation and destruction of areas during construction. Additional indirect effects of other activities are largely attributed to increased human activity, which could displace individuals or reduce the coming years breeding success. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take.

3.4 MITIGATION AND MONITORING

Leasing stipulations generally provide for the development of mitigation and monitoring of post-leasing activities when proposals for exploration and development of the parcels are submitted for approval.

Geologic and Socio-Economic Resources

No mitigation to address geologic or socio-economic concerns can be anticipated at the leasing stage.

Cultural Resources, Paleontological Resources and Native American Concerns

Most adverse effects to cultural and paleontological resources would be mitigated through project design, redesign, relocation, or in some cases of historic properties eligible for their research potential, through data recovery. Specific avoidance measures and other applicable mitigation and monitoring measures discussed in the environmental assessment for the August 2006 Noncompetitive Geothermal Lease Sale (BLM/EK/PL-2006/14) would be applicable for the currently nominated parcels.

As noted in chapter 2 and section 3.2.3 of this EA, all leases would include the Cultural Resources/Native American Consultation stipulation (OG-010-05-03) to protect cultural resources, including traditional properties of importance to Native Americans. In addition, stipulation OG-010-05-013 for Historic Trails could be applicable to parcel NV-08-07-069 near the Hastings Cutoff.

If geothermal exploration or development is planned in areas with moderate to high potential for containing vertebrate or rare invertebrate and paleobotanical fossils, a paleontological resources inventory would be required to identify these resources. If possible the project would be modified to avoid such resources. If avoidance is not possible data recovery would be undertaken to retrieve the fossils and associated information.

Both geothermal leasing and development are recognized and acceptable uses of lands administered by the BLM under the Federal Land Policy and Management Act of 1976. The Cultural Resources/Native American Consultation stipulation advises potential lessess that, in accordance with the National Historic Preservation Act, the American Indian Religious Freedom Act, the Native American Graves Protection and Repatriation Act, Executive Order 13007 (Sacred Sites), or other statutes and executive orders, the BLM must provide affected tribes an opportunity to comment and consult on proposed actions. BLM would attempt to limit, reduce, or possibly eliminate any impacts to Native American traditional, cultural and/or spiritual sites, activities, and resources.

Issuing a lease would not obstruct or limit traditional/cultural/spiritual use or bar access to a site. If, as a result of leasing, a ground disturbing plan to explore for or develop geothermal resources is submitted to BLM, all applicable laws, regulations, directives, SOPs, and stipulations and limitations would apply. By including the protective stipulation in all leases, BLM reserves the right to deny or alter proposed activities associated with any surface occupancy that results from

geothermal leasing. This includes identifying locations having traditional, cultural and/or religious values to Native Americans and developing measures to insure that actions would not unduly or unnecessarily burden the pursuit of traditional religion or traditional lifeways.

Based on additional information gathered during continuing tribal consultation, mitigation and monitoring measures may be imposed. These include but are not limited to deferring sale of a lease pending identification of significant sites (Elko District's preferred alternative for two of the ten currently nominated parcels); designating "no surface occupancy" in areas of high cultural significance; or providing tribal monitoring opportunities to affected tribe(s) as a condition of approving any ground disturbing proposals submitted to the BLM as a result of the geothermal lease.

Soil, Water and Air Resources

Best management practices along with specific restrictions would be implemented to minimize soil erosion, facilitate vegetation recovery and protect water and air resources.

Protection of water resources would be accomplished through implementation of best management practices along with specific restrictions that would be applied to individual parcels. For example, lessees would be required to locate facilities a certain distance from streams or off of the 100-year floodplain. These restrictions would be implemented on an individual parcel basis and would serve as a condition of approval for exploration and development.

Implementation of best management practices and restrictions would lessen but not eliminate the probability of water resource contamination. In the event of accidents such as reserve pit failure or groundwater pollution, the lessee would be legally and monetarily responsible for decontamination.

Soil disturbing activities would take place at times when these factors minimize dust production. Facilities that emit unacceptable gaseous emissions would not be permitted. Best management practices along with specific restrictions would be implemented to minimize impacts to air resources.

Vegetation and Invasive Non-native Species

Proposed leasing activities are evaluated and monitored for the presence and control of noxious weeds. Best management practices along with specific restrictions would be implemented to minimize impacts to affected vegetative communities and reduce the spread of invasive, non-native weeds.

A. Clean equipment of all mud, dirt and plant parts before moving into relatively weed-free areas.
B. Include weed prevention and treatment in all plans for surface disturbance and reclamation
C. Ensure all disturbed soil is revegetated as soon as possible to establish competition against invasive weeds
D. Incorporate weed prevention into road layout, design and alternative evaluation (where road construction is required)

All seed used for reclamation on public lands would meet standards existing at the time of the proposed project to reduce potential for invasion of disturbed sites by non-native weeds. Standard are expected to evolve as more is learned about invasive weeds.

Forestry

Measures to reduce impacts of leasing activities on forest resources could include avoiding the removal of trees, except when necessary by rerouting or relocating road routes and facilities, or by limbing trees. Trees requiring removal should be disposed of by the operator. Where blading is required, stumps would be removed or buried in an area designated by the Authorized Officer. Where blading is not required, stump height should not exceed 12 inches. All slash less than four inches in diameter should be chipped, scattered outside the cleared area, or stockpiled for use during reclamation as directed by the Authorized Officer. All material four inches in diameter and greater would be removed from federal land unless otherwise directed. A wood permit from BLM for the wood removed (for the appraised value) would be required prior to any clearing. Best management practices along with specific restrictions would be implemented to minimize impacts to forest resources.

Special Recreation Management Areas

The Lease stipulations prevent impacts to high use, developed recreation areas. The Special Recreation Management Areas stipulation prevents surface occupancy within ½ mile of the high water line where reservoirs are present and restrictions to existing access within the remainder of the recreation area. The Tabor Creek Campground stipulation also prevents surface occupancy within this high use area. Project-specific review of post-leasing activities and use of best management practices would lessen conflicts and hazards with dispersed recreational use of the leased areas.

Visual Resources Management

In spite of the fact that most of the proposed lease areas are in VRM Class IV, reasonable attempts should be made to lessen visual impacts. Design mitigation techniques are applied to screen projects from view. Strategies include color selection, layout of earthwork, vegetative manipulation, placement of structures, materials selection and reclamation or rehabilitation. Design techniques and VRM requirements are provided by various publications describing Best Management Practices, including those for Visual Resource Management for Fluid Minerals.

Wetlands and Riparian Areas

Executive Order 11990, May 24, 1977, directs federal agencies to take appropriate actions to avoid, to the extent possible, long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct support of new construction in wetlands wherever there is a practicable alternative.

Current BLM policy (Elko RMP ROD, page 37) restricts ground disturbance within 400 feet of stream banks and requires that if equipment is to cross drainages, adequately sized culverts must be used for water passage or equipment must cross at low water crossings (no fill). This buffer could be greater as determined by the Elko District, to protect riparian areas against adverse impacts such as increased sedimentation, impacts to water quality and quantity and loss of

riparian vegetation. Best management practices along with specific restrictions would be implemented to minimize negative impacts to riparian resources.

1. In canyons containing perennial streams, no drilling or road building would be allowed on slopes steeper than 15%.
2. Any open body of water, such as a canal, ditch, slough, pond, creek, lake, or stream and riparian areas would be avoided by a buffer zone of 400 feet. This buffer would be greater as determined by the Elko BLM District Office, in order to sufficiently protect riparian areas against adverse impacts such as increased sedimentation, impacts to water quality and quantity and loss of riparian vegetation.

Restricting exploratory drilling and road building to 15% slopes or less in canyons of perennial streams would prevent deterioration of riparian habitat due to sedimentation. The effect of such a restriction on geothermal development would mean that high elevation drilling would be done near ridge tops and on benches, well away from streams that were also on slopes 15% or less.

Additional mitigation and monitoring measures would need to be established to protect important fisheries resources at the time leasing activities are proposed. A field examination would also be required to determine the presence of any fish species where application has been made for site-specific geothermal development activity.

Wild Horses

Construction of fencing within a Herd Management Area would be evaluated during review of a development proposal to determine if flagging or other measures would be necessary to increase visibility to wild horses. Best management practices along with specific restrictions will be implemented to minimize negative impacts to wild horses.

Invasive Non-Native Species

Use of current standards for seed used to reclaim public lands, best management practices, and specific restrictions help to minimize the spread of invasive, non-native species, and current standards for seed used to reclaim public lands. Measures for exploration and development activities include:

1. Clean equipment of all mud, dirt and plant parts before moving into relatively weed-free areas.
2. Include weed prevention and treatment in all plans for surface disturbance and reclamation.
3. Ensure all disturbed soil is revegetated as soon as possible to establish competition against invasive weeds.
4. Incorporate weed prevention into road layout, design and alternative evaluation (where road construction is required).

Fisheries

As described above for riparian areas, Exploratory drilling and road building would be restricted to 15% slopes or less in canyons of perennial streams, to prevent deterioration of riparian habitat

due to sedimentation. The effect of such a restriction on geothermal development would mean that high elevation drilling would be done near ridge tops and on benches, well away from streams that were also on slopes 15% or less (Elko RMP ROD, page 37). Impacts to an open body of water, such as a canal, ditch, slough, pond, creek, lake, or stream and riparian areas would be avoided by a buffer zone of 400 feet. This buffer could be greater as determined by the Elko District, to protect fisheries and other aquatic resources against adverse impacts such as increased sedimentation, impacts to water quality and quantity and loss of riparian vegetation. Best management practices along with specific restrictions would be implemented to minimize negative impacts to riparian resources.

Terrestrial Wildlife, Migratory Birds and Special Status Species

A field examination would be required to determine the presence of any wildlife species where application has been made for site-specific geothermal development activity. Site specific mitigation and/or mitigation measures would need to be established to protect and conserve important wildlife resources.

Big Game

In addition to the stipulations for big game species, protective measures and/or operating limitations could be established for mule deer fawning season (5/15-7/15), antelope fawning season (5/1-6/30) and Rocky Mountain elk rutting and calving seasons (8/15-10/1, 5/15-7/1). Extensive areas in the Elko District have been identified as elk range and are subject to seasonal protection from disturbance. Determining fawning, calving and rutting season buffer zones for mule deer, antelope and elk on a site-specific basis would increase the protection BLM could afford these animals.

Sensitive Raptors and Migratory Birds

Seasonal restriction on leasing activities would be implemented around active nesting sites of raptors and migratory birds. Power lines would be constructed to include apparatus that discourages raptor perching.

Ground disturbing activities during the raptor nesting season (OG-010-05-02) and migratory bird-nesting season (March to July) would be avoided to protect migratory birds. Appropriate inventory for migratory birds should be conducted prior to site development during the nesting season to identify either breeding adult birds or nest sites within the areas to be disturbed. If active nests are present, the proponent would coordinate with the BLM to develop appropriate protection measures for these sites, which would include avoidance, construction constraints, and/or buffers.

Lease stipulations OG-010-05-07, -08 and -09 provide protections for sage grouse. Activity on parcels identified as sage grouse habitat must avoid surface disturbance within 0 .5 mile or other appropriate distance based on site-specific conditions of leks, or within 0.6 mi. (1 km.) of known nesting, brood-rearing and winter habitat. The following additional mitigation measures are based on the Interim Sage Grouse Management Guidelines for Nevada:

A. Seasonal restrictions of 2 miles (3.2 km) of known crucial habitat as determined by the Elko District Office during the dates of 3/1-5/15 and/or 5/15- 8/15, inclusive. Avoid

permanent occupancy of potential habitat where possible; where not possible, consider off-site mitigation.

B. All surface disturbances occurring in potential or known habitat areas shall be reclaimed as soon as possible in such a way as to result in conditions suitable for sage grouse habitat.
C. Avoid permitting or leasing energy or mineral-associated facilities or activities in known sage grouse habitat, as practicable (e.g. modifying location, implementing time-of-year and/or time-of-day restrictions, etc.)

The current BLM stipulations for greater sage grouse include ground disturbance restrictions of ½ mile radius around an active lek and a 2 mile seasonal restriction during nesting/brooding periods. The ½ mile radius is considered by the BLM to be an acceptable distance for minimal disturbances of a lek as stated in the Horse Canyon State Director Decision, 2005 even though it falls short of the recommended distance put forth in the Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada (2000) of a 2 mile permanent ground disturbance restriction.

Threatened, Endangered and Sensitive Species
In addition to the above-mentioned stipulations for sensitive raptors (OG-010-05-02) and sage grouse (OG-010-05-07, -08 and -09), all geothermal lease parcels have known special status species habitat and, as such, are subject to restrictive and seasonal protection from disturbance (OG-010-05-01).

An inventory for special status species is required on lease parcels in known or potential habitat for threatened, endangered or candidate species. Appropriate inventories for sensitive species of vegetation and wildlife would be conducted prior to site development. If sensitive species occupy sites proposed for development, it would be necessary to exclude disturbance, and/or develop mitigation and monitoring measures to avoid adverse impacts to the species.

A 0.5-mile buffer from all activity would be imposed or the BLM would coordinate, informally, with the U.S. Fish and Wildlife Service (FWS) if the proposed action is within habitat of a listed or proposed threatened or endangered species. All actions would be submitted to the FWS if BLM determines the action “may affect” a listed threatened or endangered species.

Those populations or occurrences of special status species for which analysis determines protection to be necessary would be protected by: 1) relocation or rerouting of the proposed travel routes: or 2) applying other protective mitigation measures as deemed necessary by the authorized officer (Elko RMP, ROD).

4 – CONSULTATION AND COORDINATION

4.1 PERSONS, GROUPS OR AGENCIES CONSULTED

4.1.1 Public Scoping

The Elko Field Office hosted an open house on November 7, 2007 to obtain input for a district-wide analysis for geothermal leasing, and letters were sent out on November 21, 2007, with a request for comments by December 31, 2007. BLM received responses from:

- Yomba Shoshone Tribe; Dennis Bill, Chair; Austin NV
- Western Watersheds Project, Katie Fite, Biodiversity Director, Boise ID
- Western Shoshone Defense Project, Julie Ann Fishel, Land Recognition Program, Crescent Valley NV

Input received raised questions raised concerning the status of leasing activities throughout the Elko District, and the lack of specificity for parcels currently proposed for leasing. BLM resumed preparation of this EA upon receipt of a proposal from the Nevada State Office that identified Elko District parcels nominated by industry for inclusion in the upcoming statewide competitive geothermal lease sale.

Comments included the opinion that an EIS must be completed to support a leasing decision, and that the analysis must include current information on leasing activities, conditions and interactions with other past, present and reasonable foreseeable future action throughout the areas covered by the 1985 Wells RMP and 1987 Elko RMP. In response, the Elko District updated a reasonably foreseeable future development scenario for geothermal leasing, and included information on cumulative impacts.

This EA will be available for review on the Elko office NEPA webpage, from the public website at www.blm.gov/nv and will be mailed to those who provided scoping input or request a copy.

4.1.2 Coordination with Other Agencies and Tribes

Coordination with the Elko County resulted in their expressing support for the leasing and development of geothermal resources.

The Nevada Department of Wildlife has provided information for use in updating the analysis of effects of geothermal leasing and related activities on fish and wildlife that occur on habitat in the Elko District.

A discussion of the results of coordination with all tribes with interest in the Elko District is included in the section on Native American Concerns (3.2.13). Consultation to address tribal concerns for leasing of parcels near Beowawe and in Ruby Valley is ongoing, and resulted in identification of the Elko District's preference for deferring offering of these two parcels in the statewide lease sale, to be held in August 2008.

4.2 PREPARERS

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Lorrie West	Land Use Plan Conformance, NEPA Compliance
Tim Murphy	Cultural Resources
Danielle Storey	Native American Concerns
Tamara Hawthorne	Recreation, Wilderness, Visual Resource Management
Nycole Burton	Wildlife, Aquatics, Wetlands/Riparian Zones, Special Status Species
Amy Ruhs	Grazing, Vegetation
Kimberly Fore	Lands/Realty
Mark Coca	Invasive Non-native Weed Species
Mark Dean	Soil, Water, Air

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