U.S. Department of the Interior
Bureau of Land Management

Elko Field Office
3900 E. Idaho Street
Elko, NV 89801
http://www.nv.blm.gov/elko

September 2005

Programmatic Environmental Assessment

(BLM/EK/PL-2005/030)

December 2005 Oil & Gas Lease Sale

File: 3100

United States Department of the Interior
Bureau of Land Management
Elko Field Office

December 2005 Oil & Gas Lease Sale
Environmental Assessment

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DECEMBER 2005 OIL & GAS LEASE SALE
Environmental Assessment
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(3100; BLM/EK/PL-2005/030)

1 - INTRODUCTION

The Bureau of Land Management (BLM), is considering offering up to 202 parcels, comprising about 250,000 acres of land in northeastern Nevada within the area administered by the Elko Field Office, in a state-wide competitive oil and gas lease sale to be held in December 2005. See Map 1. 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. Maps showing the general location of the parcels and their ownership status are attached.

The BLM, Elko Field Office, has prepared this environmental assessment (EA) to comply with the National Environmental Policy Act of 1969 (NEPA). This EA tiers to the environmental impact statements (EISs) for the 1987 Elko Resource Management Plan and the 1985 Wells Resource Management Plan (RMPs). Additional NEPA documentation is needed prior to leasing to address new circumstances or information bearing on the environmental consequences of leasing that was not considered within the broad scope analyzed in the RMP/EIS.

Background

For decades, domestic production of oil and gas 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, with the intent of increasing the domestic supply of energy, including oil and gas.

1.1 NEED FOR AND PURPOSE OF ACTION

The need for the leasing of public mineral estate (oil and gas 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 offered for lease to encourage development of federal on shore gas and oil resources.

PROPOSED PARCELS
OIL & GAS SALE DECEMBER 2005
ELKO FIELD OFFICE (12-05)
MAP 1

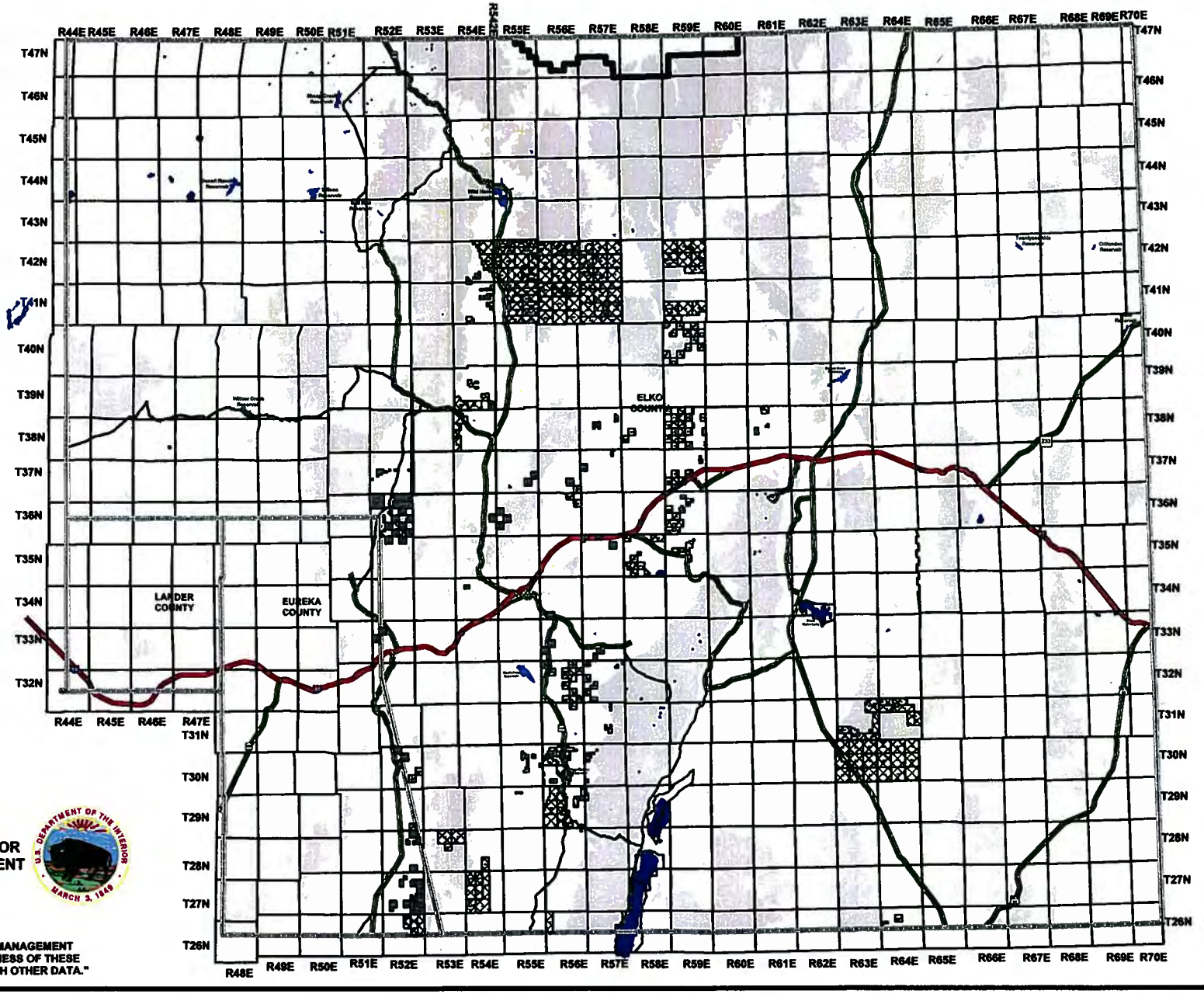
- County Boundry
- District Boundary
- Township/Range
- Available Parcels
- Withdrawn Parcels

Data is published in the
North American Datum 1983
UTM, zone 11, meters
September 7, 2005

1:880,000

Miles
0 10 20 30 40

N



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ELKO FIELD OFFICE

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The purpose of this action is to facilitate energy development where appropriate. As public mineral estate is leased for development of oil and gas resources, BLM determines stipulations which are attached to the lease for a given parcel to avoid or minimize adverse 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 Mineral Leasing Act of 1920, as amended and modified by subsequent legislation, and regulations found at 43 CFR part 3100. Oil and gas 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 energy resources, including oil and gas, is listed in 43 CFR 3160.0-3.

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 with 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 they were 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) Open – subject to standard leasing stipulations (82 percent of the RMP area)

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

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

(4) Closed – (wilderness and wilderness study areas recommended for designation).

The Wells and Elko RMPs state that all Wilderness Study Areas will be managed under the Bureaus Interim Management Policy for Lands Under Wilderness Review, H-8550-1 (IMP). No

new leases may be issued on lands under wilderness review according to the Interim Management Policy for Lands Under Wilderness Review (H-8550-1, Rel. 8-67, 1995, page 32). The wilderness study areas (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).

1.3 Relationship to Other Laws, Policies and Plans

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

Mineral Leasing Act of 1920, 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 3100, which provides regulations governing Onshore Oil and Gas Leasing

Executive Order 133212, which directs the Secretary of the Interior to expedite energy-related projects

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

Land use plans for the Humboldt Toiyable National Forest

Land use plans for Elko, Eureka and Lander counties

Nevada statutes and plans governing management of wildlife and water resources

2 - ALTERNATIVES

2.1 NO ACTION

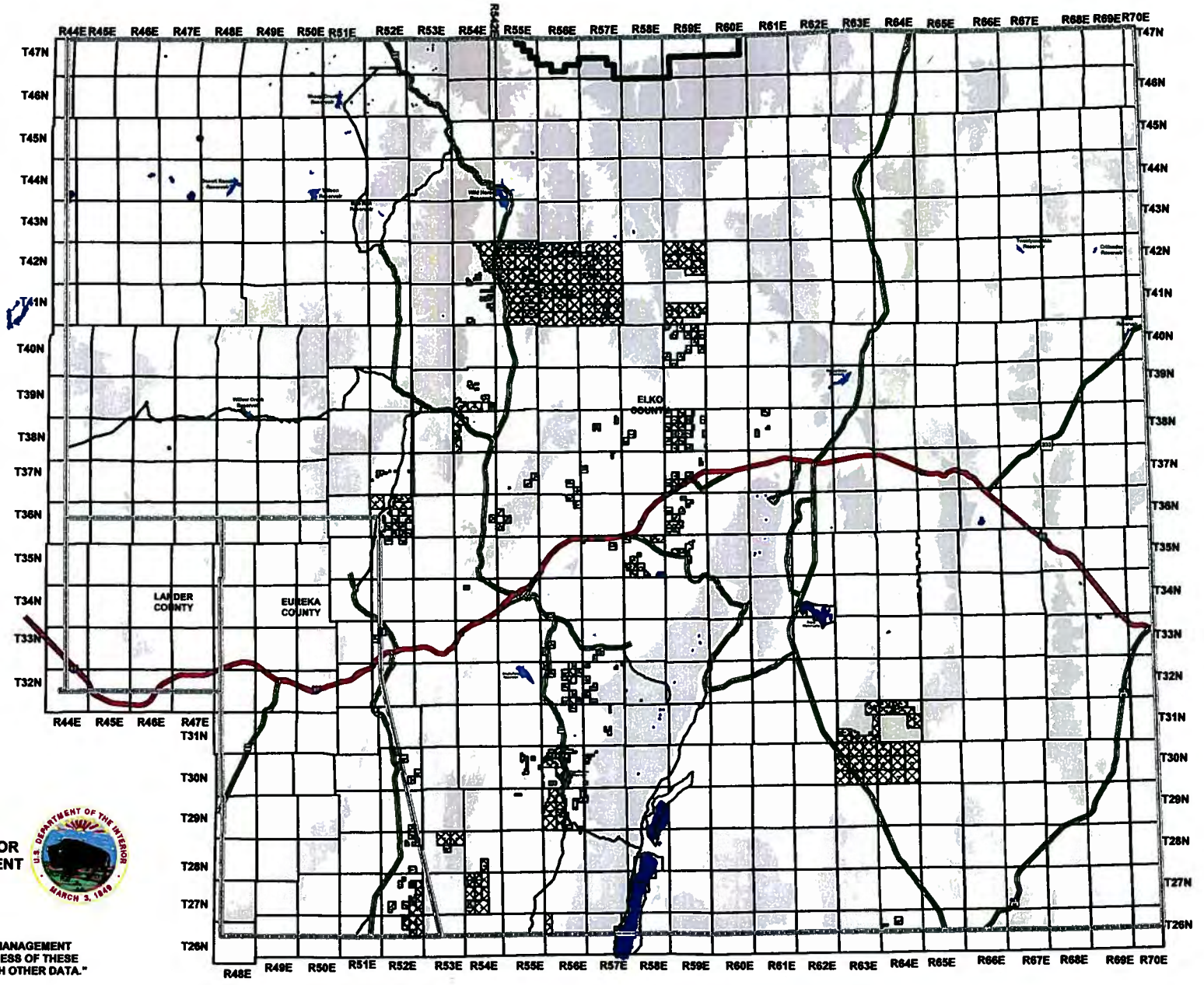
The No Action alternative is defined as, "Do not offer Elko district parcels with expressions of interest for lease in state-wide quarterly lease sales."

2.2 PROPOSED ACTION

BLM's 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, in a quarterly competitive oil and gas lease sale. 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. Lands leased would then be available for exploration and development of oil and gas resources for a 10-year period, subject to stipulations attached to the lease for a given parcel.

This EA covers the offering of leases located within the Elko District in the December 2005 lease sale. There are 202 parcels that total approximately 250,000 acres and are shown by Map 2. Appendix A contains a complete list of the parcels and legal descriptions as nominated by industry. The Elko Field Office has also determined special stipulations to attach to a lease to protect other resources (see Table 2-1). These stipulations are described in the next section, and the standardized text for each stipulation is in Appendix B. The last column of Table 2-1 also identifies 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.

AVAILABLE PARCELS
OIL & GAS SALE DECEMBER 2005
ELKO FIELD OFFICE (12-05)
MAP 2



County Boundry

District Boundary

Township/Range

Available Parcels

Data is published in the
North American Datum 1983
UTM, zone 11, meters
September 7, 2005

1:880,000

Miles
0 10 20 30 40

N

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Wilderness Study Area (WSA) Exclusions

All wilderness areas and wilderness study areas are closed to oil and gas 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.

Land management prescriptions are applied according to BLM Manual Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review. In accordance with the Nevada BLM memorandum dated September 24, 2004 (IM No. NV-2004-093), screening of the parcels nominated by industry resulted in the exclusion of the following land located within ¼ mile of a WSA boundary from the currently proposed lease sale:

Parcel No.	Legal Description of Excluded Area	Acres Excluded	Affected WSA
457	T. 30 N., R. 55 E. Sect 15 NW1/4NW1/4	40	Cedar Ridge
457	T. 30 N., R. 55 E. Sect 22 SW1/4NE1/4	40	Cedar Ridge

2.2.1 Resource Protection Stipulations

Once a parcel is leased, the lessee has the right to explore for and develop the oil and gas resources, subject to *standard lease terms* and *special stipulations* pertaining to the conduct of operations. The conduct of operations by the lessee on all parcels would be subject to the following terms from the back of the standard lease form:

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 may 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 may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessee may 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 are developed to conform to approved resource management plans and ensure post-leasing activities comply with pertinent laws and policies. Stipulations for **cultural resources** (including Native American consultation), **raptors,** and **threatened, endangered and sensitive species,** would be attached to all leases: Other stipulations that restrict surface occupancy or impose seasonal restrictions on post-leasing activities would be applied to parcels where necessary to protect resource values or uses. Based on screening of the nominated parcels, Table 2-1 lists the Elko district parcels to be offered in the sale, and identifies the special stipulations that would be attached to each lease. A summary of the stipulations that can be assigned to leases to protect resources follows. The full text of each stipulation is in Appendix B.

Cultural Resources/Native American Consultation -- This following stipulation is included in all leases to advise the potential lessee that BLM will not approve any ground disturbing activities that may affect a cultural property until it completes its obligations under applicable requirements of the NHPA and other authorities (WO IM 2005-003)

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 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 – This stipulation informs the lessee that the BLM will take whatever steps are necessary to comply with law and regulations affecting such 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 improvement. All project work will require a threatened, endangered, or sensitive species clearance before implementation. Consultation with the U.S. Fish and Wildlife Servicem 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 impacted. Other species considered sensitive, but not under the protection of the Act, are given special management considerations through Bureau policy. If adverse impacts to these other sensitive species are identified during project planning, the project will be modified or possibly abandoned to avoid these impacts (Standard Operating Procedure, Elko ROD, p. 39; WO IM 2002-174).

Raptor Nesting Sites -- 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 and Elko RMP ROD p. 25)

Mule Deer Crucial Winter Range- This stipulation prevents disturbances in crucial winter range during the winter season. (Wells RMP ROD p. 10 and Wlko RMP ROD p.3)

Pronghorn Antelope Crucial Winter Range- This stipulation prevents disturbances in crucial winter range during the winter season. (Wells RMP ROD p. 25 and Wlko RMP ROD p.3)

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

Sage Grouse Strutting Grounds – This stipulation prevents use of the surface within ½ mile of known strutting grounds. (Wells RMP ROD p. 10 and Elko RMP ROD p. 35)

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

Sage Grouse Crucial Winter Habitat – This stipulation prevents disturbance on lands identified as crucial habitat between November 1 and March 15.

I-80 Low Visibility Corridor – 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 and Elko RMP ROD p. 1)

Special Recreation Management Areas (SRMA) – 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 and Elko RMP ROD p. 3)

Tabor Creek Campground – This stipulation restricts surface occupancy within the Tabor Creek Campground. (Wells RMP ROD p. 25)

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

Remove or Defer Offering Certain Parcels in the December 2005 Sale

Several parcels have been removed from consideration in this EA since the initiation of public scoping. Reasons for their elimination include:

1. Some nominations were received too late to be included in the public scoping process for the December lease sale, and so will be deferred to the March 2006 sale. They include parcel #s 370 to 377, 379, 381 to 389, 520, 521, 593, and 595.
2. During the public scoping process, the Te-Moak Tribe of Western Shoshone requested that three parcels labeled as 039, 040, and 114 (within reservation) be removed from the December sale. Parcel 114 was removed per the request. Parcels 039 and 040 had been leased in June 2005.
3. Other tracts were removed by the Nevada State Office for administrative reasons.

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

Do Not Lease On Developed Split Estate Lands (federal mineral estate, non-federal surface) The purpose of this alternative would be to avoid disturbance to, or conflicts with use of, privately owned lands, especially in unincorporated areas with extensive residential developments such as Spring Creek, Nevada. This alternative could require amendment or revision of the Elko and Wells RMPs, which is currently scheduled to begin in 2009. It was eliminated because no unresolved conflicts resulted from scoping for the currently nominated lease sale parcels.

Table 2-1 December 2005 Parcels cleared for oil and gas leasing with stipulations where necessary

Parcel Number	01,02,03 T&E, Raptors, Cultural	OG-010-05-04 Mule Deer Crucial Winter Range	OG-010-05-05 Pronghorn Antelope Crucial Winter Range	OG-010-05-06 Pronghorn Antelope Kidding Areas	OG-010-05-07 Sage Grouse Strutting Grounds	OG-010-05-08 Sage Grouse Brood Rearing Areas	OG-010-09 Sage Grouse Crucial Winter Habitat	OG-010-05-10 I80 Visibility corridor	OG-010-05-11 SRMA	OG-010-05-12 Tabor Creek Cmpgrd	0G-010-05-13 Historic Trails	Other
NV-05-12-367	X	x										b
NV-05-12-368	X	x										b,i
NV-05-12-369	X	x										
NV-05-12-378	X											
NV-05-12-380	X											f,g,h
NV-05-12-394	X											k
NV-05-12-395	X											k
NV-05-12-396	X											k
NV-05-12-413	X											e,I,k
NV-05-12-414	X											e,k
NV-05-12-415	X											e,h,i,k
NV-05-12-416	X											e,k
NV-05-12-417	X											e,k
NV-05-12-418	X											e,k
NV-05-12-419	X											e,k
NV-05-12-420	X											e,k
NV-05-12-421	X	x										g,h,k
NV-05-12-422	X											g,h,k
NV-05-12-423	X				x	x						i,k
NV-05-12-424	X				x	x						a,h,k
NV-05-12-425	X											h,k
NV-05-12-426	X											h,k
NV-05-12-427	X											h,k
NV-05-12-428	X				x	x						k
NV-05-12-429	X											k
NV-05-12-430	X				x	x						k
NV-05-12-431	X											k
NV-05-12-432	X											k
NV-05-12-433	X				x	x						k
NV-05-12-434	X				x	x						h,i,k
NV-05-12-435	X											g,h,k
NV-05-12-436	X											a,f,g,h,k
NV-05-12-437	X											k
NV-05-12-438	X											k
NV-05-12-456	X											k
NV-05-12-457	X	x										h,i,j,k

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Parcel Number	01,02,03 T&E, Raptors, Cultural	OG-010-05-04 Mule Deer Crucial Winter Range	OG-010-05-05 Pronghorn Antelope Crucial Winter Range	OG-010-05-06 Pronghorn Antelope Kidding Areas	OG-010-05-07 Sage Grouse Strutting Grounds	OG-010-05-08 Sage Grouse Brood Rearing Areas	OG-010-09 Sage Grouse Crucial Winter Habitat	OG-010-05-10 I80 Visibility corridor	OG-010-05-11 SRMA	OG-010-05-12 Tabor Creek Cmpgrd	0G-010-05-13 Historic Trails	Other
NV-05-12-458	X		x					x				k
NV-05-12-459	X											g,h,k
NV-05-12-460	X							x				f,h,i,k
NV-05-12-461	X					x						f,k
NV-05-12-462	X					x						f,g,h,i,k
NV-05-12-463	X						x					f,h,i,k
NV-05-12-464	X				x	x		x				f,h,k
NV-05-12-465	X					x						f,h,k
NV-05-12-466	X						x					f,h,k
NV-05-12-467	X				x	x						f,h,k
NV-05-12-468	X					x		x				f,g,h,k
NV-05-12-469	X											f,h,i,k
NV-05-12-470	X				x	x						k
NV-05-12-471	X											a,h,k
NV-05-12-472	X							x				a,f,h,k
NV-05-12-473	X				x	x		x				a,f,k
NV-05-12-474	X							x				f,k
NV-05-12-475	X						x					a,f,k
NV-05-12-476	X				x	x	x					a,f,k
NV-05-12-477	X											a,f,h,k
NV-05-12-478	X											f,k
NV-05-12-479	X											f,k
NV-05-12-480	X											a,f,h,k
NV-05-12-481	X											f,h,k
NV-05-12-498	X											g,h
NV-05-12-499	X	x										f,h,k
NV-05-12-500	X			x								f,k
NV-05-12-501	X			x								f,h,k
NV-05-12-502	X			x							x	a,h,k
NV-05-12-503	X											f,h,k
NV-05-12-504	X										x	k
NV-05-12-505	X											k
NV-05-12-506	X			x							x	a,f,k
NV-05-12-507	X			x								f,h,k
NV-05-12-508	X											a,f,h,k
NV-05-12-509	X										x	a,f,h,k

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NV-05-12-510	X											a,f,h,k
NV-05-12-511	X				x	x					x	a,f,h,i,k
NV-05-12-512	X											a,f,h,k
NV-05-12-513	X											h,k
NV-05-12-514	X			x								k
NV-05-12-515	X											h,i,k
NV-05-12-516	X											k
NV-05-12-517	X											k
NV-05-12-518	X											k
NV-05-12-522	X		x					x				g,h,k
NV-05-12-523	X		x									k
NV-05-12-524	X											k
NV-05-12-525	X					x						f,g,h,k
NV-05-12-526	X				x	x						f,g,h,i,k
NV-05-12-527	X					x						f,g,h,i,k
NV-05-12-528	X											f,g,h,k
NV-05-12-529	X				x	x	x					f,g,h,k
NV-05-12-530	X						x					f,k
NV-05-12-531	X				x	x	x					f,g,h,k
NV-05-12-532	X				x	x						f,k
NV-05-12-533	X						x					f,i,k
NV-05-12-534	X											f,k
NV-05-12-535	X				x	x						a,f,i,k
NV-05-12-536	X				x	x						a,f,g,h,i,k
NV-05-12-537	X											f,g,h,k
NV-05-12-538	X											f,g,h,k
NV-05-12-539	X				x	x						a,f,g,h,i,k
NV-05-12-540	X											f,h,k
NV-05-12-541	X											f,h,k
NV-05-12-542	X						x					f,g,h,k
NV-05-12-543	X				x	x						h,k
NV-05-12-586	X						x					h,i,k
NV-05-12-587	X					x						k
NV-05-12-588	X											f,h,k

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NV-05-12-589	X											f,h,k
NV-05-12-590	X											k
NV-05-12-591	X											k
NV-05-12-592	X				x	x						h,k
NV-05-12-594	X							x			x	g,h,k
NV-05-12-596	X				x	x	x					f,g,h,k
NV-05-12-597	X					x						f,g,h,k
NV-05-12-598	X					x						f,k
NV-05-12-599	X											f,g,h,i,k
NV-05-12-600	X					x						f,g,h,i,k
NV-05-12-601	X				x	x						f,k
NV-05-12-602	X					x	x					f,g,h,k
NV-05-12-603	X					x						f,g,h,i,k
NV-05-12-604	X					x						f,h,k
NV-05-12-605	X					x						f,g,h,k
NV-05-12-606	X				x	x						f,g,h,i,k
NV-05-12-607	X					x						h,k
NV-05-12-608	X				x	x						k
NV-05-12-609	X					x	x					f,g,h,k
NV-05-12-610	X											k
NV-05-12-611	X				x	x						k
NV-05-12-612	X					x						f,g,h,k
NV-05-12-613	X					x						k
NV-05-12-614	X					x						f,g,h,k
NV-05-12-615	X					x						f,g,h,k
NV-05-12-650	X											f,k
NV-05-12-651	X										x	k
NV-05-12-652	X					x						f,k
NV-05-12-653	X					x						k
NV-05-12-654	X					x						k
NV-05-12-655	X		x									f
NV-05-12-702	X										x	f,g,h,k
NV-05-12-703	X				x	x						k
NV-05-12-704	X					x						f,g,h,k
NV-05-12-705	X											f,g,h,k
NV-05-12-706	X											k

Table 2-1 December 2005 Parcels cleared for oil and gas leasing with stipulations where necessary

Parcel Number	01,02,03 T&E, Raptors, Cultural	OG-010-05-04 Mule Deer Crucial Winter Range	OG-010-05-05 Pronghorn Antelope Crucial Winter Range	OG-010-05-06 Pronghorn Antelope Kidding Areas	OG-010-05-07 Sage Grouse Strutting Grounds	OG-010-05-08 Sage Grouse Brood Rearing Areas	OG-010-09 Sage Grouse Crucial Winter Habitat	OG-010-05-10 I80 Visibility corridor	OG-010-05-11 SRMA	OG-010-05-12 Tabor Creek Cmpgrd	0G-010-05-13 Historic Trails	Other
NV-05-12-707	X		x									f,k
NV-05-12-708	X										x	f,k
NV-05-12-709	X											k
NV-05-12-710	X		x		x	x						a,f,k
NV-05-12-711	X		x									a,f,i
NV-05-12-712	X		x									f
NV-05-12-713	X		x									a,f
NV-05-12-714	X		x									f
NV-05-12-715	X		x									a,f,k
NV-05-12-716	X			x		x						f,k
NV-05-12-717	X			x		x						f,g,h,i,k
NV-05-12-718	X					x						f,k
NV-05-12-719	X			x								f,i,k
NV-05-12-720	X			x								f,g,h,k
NV-05-12-721	X			x		x						f,k
NV-05-12-722	X					x						f,g,h,k
NV-05-12-723	X			x								f,g,h,k
NV-05-12-724	X			x		x						f,g,h,k
NV-05-12-725	X											f,g,h,k
NV-05-12-726	X				x	x						f,g,h,k
NV-05-12-727	X											f,g,h,k
NV-05-12-728	X											f,g,h,k
NV-05-12-729	X				x	x						f,k
NV-05-12-730	X											f,k
NV-05-12-731	X											f,k
NV-05-12-732	X											f,g,h,k
NV-05-12-745	X											i
NV-05-12-746	X		x									
NV-05-12-749	X	x		x			x		x		x	e,i,k
NV-05-12-750	X	x		x			x					e,k
NV-05-12-751	X	x		x			x					a,e,k
NV-05-12-752	X	x					x					e,k
NV-05-12-753	X	x					x					a,e,k
NV-05-12-754	X											b,d,e,k
NV-05-12-755	X											b,d,e,k
NV-05-12-756	X											a,b,d,e,k

Table 2-1 December 2005 Parcels cleared for oil and gas leasing with stipulations where necessary

Parcel Number	01,02,03 T&E, Raptors, Cultural	OG-010-05-04 Mule Deer Crucial Winter Range	OG-010-05-05 Pronghorn Antelope Crucial Winter Range	OG-010-05-06 Pronghorn Antelope Kidding Areas	OG-010-05-07 Sage Grouse Strutting Grounds	OG-010-05-08 Sage Grouse Brood Rearing Areas	OG-010-09 Sage Grouse Crucial Winter Habitat	OG-010-05-10 I80 Visibility corridor	OG-010-05-11 SRMA	OG-010-05-12 Tabor Creek Cmpgrd	0G-010-05-13 Historic Trails	Other
NV-05-12-757	X					x						d,e,k
NV-05-12-758	X	x					x					b,e,g,h,k
NV-05-12-759	X	x					x					b,e,k
NV-05-12-760	X	x					x					e,k
NV-05-12-761	X	x					x					a,e,k
NV-05-12-762	X	x					x					a,e,k
NV-05-12-763	X	x					x					e,i,k
NV-05-12-764	X											e,k
NV-05-12-765	X	x		x			x					b,d,e,k
NV-05-12-766	X	x		x			x					b,d,e,k
NV-05-12-767	X	x		x			x					e,k
NV-05-12-768	X	x			x	x	x					b,d,e,k
NV-05-12-769	X	x					x					b,d,e,k
NV-05-12-770	X	x					x					b,d,e,k
NV-05-12-771	X											e,k
NV-05-12-772	X				x	x						b,d,e,k
NV-05-12-773	X				x	x						b,d,e,k
NV-05-12-774	X	x				x	x					e,k
NV-05-12-775	X	x					x					e,i,k
NV-05-12-776	X	x				x	x					b,d,e,k
NV-05-12-777	X	x				x	x					e,i,k
NV-05-12-778	X	x				x	x					e,k

Key to "Other" Column

A.	Historic roads or trails eligible for listing on the National Register of Historic Places are or may be present. Mitigation of impacts could require substantial buffers to protect the viewshed of the trail.
B.	Historic structures or remains of structures eligible for listing on the National Register of Historic Places are or may be present. Mitigation of impacts could require substantial buffers to protect viewsheds around buildings or communities.
C.	Remains of a historic railroad eligible for listing on the National Register of Historic Places is or may be present. Mitigation of impacts could require substantial buffers to protect the viewshed of the trail.
D.	Although all surface use authorizations would be subject to review, and mitigative measures may be required for cultural resources in any of these parcels, the Elko Field Office advises potential lessees that the these parcels are in areas with high potential for containing important cultural resources. Implementing measures to mitigate impacts to cultural resource may delay timeliness of permit approvals and restrict surface occupancy.
E.	Parcel is in a Herd Management Area.

Table 2-1 December 2005 Parcels cleared for oil and gas leasing with stipulations where necessary

Parcel Number	01,02,03 T&E, Raptors, Cultural	OG-010-05-04 Mule Deer Crucial Winter Range	OG-010-05-05 Pronghorn Antelope Crucial Winter Range	OG-010-05-06 Pronghorn Antelope Kidding Areas	OG-010-05-07 Sage Grouse Strutting Grounds	OG-010-05-08 Sage Grouse Brood Rearing Areas	OG-010-09 Sage Grouse Crucial Winter Habitat	OG-010-05-10 I80 Visibility corridor	OG-010-05-11 SRMA	OG-010-05-12 Tabor Creek Cmpgrd	0G-010-05-13 Historic Trails	Other
F.	100 year floodplain exists within the parcel. Restrictions similar to those in 40CFR 257.3-1 will apply.											
G.	High priority stream habitat (Elko RMP) or stream habitat (Wells RMP) exists in or near the parcel. Development restrictions or mitigation											
	measures may apply in order to insure that water quality standards necessary for stream habitat are met.											
H.	Streams that fall under Clean Water Act 303(d) regulations exist in or near the parcel. Development restrictions or mitigation											
	measures may apply in order to insure achievement of state and federal water quality goals.											
I.	Noxious weeds present											
J.	Portions are within 1/4 mile of a WSA											
K.	Wildlife Habitat Concerns											

3 - AFFECTED ENVIRONMENT/ENVIRONMENTAL EFFECTS

General Setting

The Elko District is typical of the Great Basin, the lands generally between the Wasatch Range of Utah and the Sierra Nevada mountains of California. The land is characterized by north-south oriented fault block mountain ranges separated by broad, flat valleys. The 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 with substantial areas of 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 Field Office.

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 currently proposed lease sale would offer parcels scattered throughout the district subject to special stipulations where applicable.

As of August 2004, over 48 million barrels of oil have been produced from oil fields within Nevada. There are geologic strata within the 7.2 million acres of public land managed by the Elko Field Office which have been identified as potential sources of oil and gas. Because of the potential for oil and gas, as estimated by United States Geological Survey, public lands and mineral estate within the Elko District have been available for oil and gas leasing for decades.

See Appendix C for a projection of leasing related activities over the next 15 years. Post-leasing activities such as geophysical exploration and development of wells 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 and mining activities. The existing condition of land that are leased are are reflective of adverse effects associated with past uses in combination with natural events such as wildlfire and drought. The Great Basin Restorative Initiative, stream/riparian and upland restoration projects are burned area rehabilitation projects are examples of ongoing actions that to improve rangeland health of public lands throughout the Elko district.

3.1 CRITICAL ELEMENTS NOT AFFECTED

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

- Areas of Critical Environmental Concern (Salt Lake ACEC)

- Farm Lands (Prime or Unique)
- Environmental Justice
- Hazardous or Solid Wastes
- Wild and Scenic Rivers

3.2. EFFECTS OF THE ALTERNATIVES

Resources present and brought forward for analysis are discussed by the following subsections.

Reasonably Foreseeable Development (RFD) Scenario. See Appendix C for a projection of leasing related activities over the next 15 years.

3.2.1 Geology

Existing Conditions

Because of the potential for oil and gas, as estimated by United States Geological Survey, public lands and mineral estate within the Elko District have been available for oil and gas leasing for decades. There are only two producing oil fields within the boundaries of the Elko district. Both are in Pine Valley but only one, the Blackburn Oil Field, is on public lands. The other, the Tomera Ranch Oil Field (Hansen and Ransom, 1990a), is on private land, as are two abandoned oil fields. Three Bar (Dlouhy, 1990) and North Willow (Hansen and Ransom, 1990b) produced small amounts of oil (24,000 barrels and 46,000 barrels) in the past but are not presently producing significant amounts of oil. The Blackburn Field (Jonannenesen and Cole, 1990), which has produced about five million barrels, includes seven oil wells of which four, all on public land, continue to produce. The Tomera Ranch Oil Field has produced about 36,000 barrels. Production rates are declining at both fields. (Davis, 2004)

Reasonably Foreseeable Development Scenario

Anytime during the 10-year term of the lease, the lessee, or operator, may submit specific plans for exploration and development to BLM for approval. These plans may be in the form of a Notice of Intent for Geophysical Exploration, or an Application for Permit to Drill (APD), Notice of Staking or Sundry Notice. BLM then reviews the submission to determine if there are any other site-specific conditions of approval that should be applied. Such conditions of approval must be consistent with the lease rights granted. In conjunction with obtaining approval to explore or develop a leased parcel, the operator may also seek a right-of-way to access the leased lands.

The following paragraphs provide a general description of possible post-leasing activities. Detailed explanations are located in Appendix D.

Geophysical exploration is used to obtain detailed geologic information. A variety of exploration methods are employed, ranging from placing electors in the ground, to detonating explosives to create shockwaves, to employing specially constructed off-road vehicles to produce

vibrations. The most commonly used method in eastern Nevada is the vibroseis technique, which uses large off-road vehicles with "thumpers" to generate shockwaves for two or three dimensional surveys.

Exploratory drilling (a wildcat well) begins development of a lease. An Application for Permit to Drill (APD) is filed with the BLM. A field examination is conducted and NEPA review is completed before a drilling permit is issued. An access road and a well pad are constructed for each well, if needed. Total disturbance attributed to drilling an exploration well is usually limited to five to ten acres for the pad and access road. Statistically, over 95% of exploration wells are dry.

In-field drilling of additional exploration wells typically occurs when initial drilling has located oil or gas, to define the limits of the oil or gas reservoir. The process of in-field drilling is the same as that employed for initial exploratory drilling, although new roads and pads may not be required in every instance.

Production begins only if oil or gas can be transported to a market and sold at a profit. In the Elko district, because of the limited infrastructure, pumped oil is generally piped a short distance for temporary storage, then all crude oil is trucked to a refinery for processing. That is not likely to change because of the small quantity of resource estimated to be present in the Elko District. Production facilities may include one or more of the following: a well head; pumping equipment; a separation system; pipelines; a metering system; storage facilities; water treatment and injection facilities; cathodic protection systems; electrical distribution lines; compressor stations; communication sites; roads; salt water disposal systems; dehydration sites; and, fresh and salt water plant sites.

Well abandonment may be temporary or permanent. Wells are sometimes shut-in because pipelines or roads needed for production and marketing don't exist and the cost for construction is not justified by the quantity of oil discovered. These wells may later be reentered when their production can be marketed. The permanent abandonment of a well occurs when the well is determined to no longer have a potential for economic production, or when the well cannot be used for other purposes.

Reclamation. Abandonment includes removal of facilities and reclamation of surface disturbance. In the case of exploration wells which do not find economically recoverable amounts of oil, initial reclamation (recontouring), is usually completed the following year which provides for sufficient time for the reserve pit to dry out. After revegetation of the site is completed, usually within two to three years, reclamation is complete. If an exploration well finds economically recoverable quantities of oil, all disturbed surface except the small amount needed for a pump and access is reclaimed immediately.

Effects

Oil and gas is a nonrenewable resource. Once the oil and gas is pumped and consumed, there is no more. Discovery and production includes the potential for release of noxious gases (Layton, et al, 1984) but there is no history of such in the 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.

The Reasonably Foreseeable Development Scenario from Appendix C concludes that the Elko District can expect to see a total of 1,650 miles of seismic surveys, 80 exploration wells, discovery and development of two mid-size oil fields and two small oil fields. The seismic surveys are expected to result in 788 acres of disturbance of which 683 would be reclaimed at the end of the 15 years (13 of 15 years of exploration activities). The exploration wells and development and production activities would disturb 858 acres of which 677 would be reclaimed at the end of 15 years while 181 acres will still be in use for production facilities.

Mitigation

No mitigation is needed.

3.2.2 Socio-Economics

Existing Conditions

Oil and gas and energy 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, usually pay relatively well, resulting in Elko County having the second highest median household income in Nevada at just over $48,000 per year. Like gold, oil and gas are shipped out of the area for processing and use. Thus the exploitation of oil and gas resources benefits both the local and national economy.

The BLM leases public lands and other Federal land, including National Forest lands, for oil and gas exploration and development and supervises operations of the leases for development and production. Within Nevada, BLM manages 1,099 federal leases which encompass 1,673,065.577 acres for oil and gas leasing. Over three million acres were offered for lease in 2003. Only a small percentage of those leases were sold, resulting in bonus bid revenue of $296,350.20. Since 1996, the revenue generated for the state of Nevada from Elko County mineral activities on public land, ranged from $59,000 in 1999 to $253,000 in 2001. The latest figures readily available from the Minerals Management Service shows 2001 revenue from oil and gas and geothermal programs in Nevada to be more than 6.5 million dollars. More than three million dollars of that revenue was disbursed to state and local government.

Effects

Leasing, exploration, and development of oil and gas 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 mineral deposits. 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 ownerships 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 mineral resources at a particular location. That information can usually be used to infer geology and mineral 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 oil and gas.

Oil production from federal lands results in a 12.5%-of-production royalty payment to the federal government. 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 oil production operators and the employees thereof. On the flip side, government may be providing additional services such as new roads, and road maintenance which results from oil 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 oil and gas 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, powerlines, 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.

Mitigation

No mitigation is needed.

3.2.3 Cultural Resources

Existing Conditions

Cultural resources are defined as those fragile and nonrenewable remains of human activity representing lifestyles, events or periods of the past as reflected in sites, districts, structures, artifacts, architecture or places.

The Elko District lies in the north-central Great Basin and has been inhabited by humans for around 12,000 years. Approximately 15% of the Elko District has been inventoried for cultural resources and over 13,000 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, toolstone procurement locations, religious sites, and rock art localities.

The Elko District also contains abundant evidence of historic era heritage 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.

Most locations of proposed oil and gas lease have not been inventoried for cultural resources. Cultural resources on non-inventoried lands within the current proposal and future leases are expected to be similar to those recorded previously. Resources known to exist within the 2005 lease-sale parcels include segments of the California National Historic Trail, the Tuscarora Stage Road, the Elko-Idaho Freight road, the Jarbidge road, the Gilson Toll Road, the Denver-Shepard wagon road, the Sprucemont-Cherry Creek freight road, Eureka-Palisade railroad grade, the Mineral Hill Mining District/townsite, Sprucemont Mining District/Black Forest townsite, several aboriginal pronghorn traps, and various other significant archaeological resources.

Effects

The act of selling oil and gas 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 can foreclose the authorized officer's use of some mitigation measures. Once issued a lease bestows upon its owner 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" (43 CFR§ 3101.1-2) subject to specific nondiscretionary statutes and lease stipulations. "Reasonable" mitigation measures may be required by the authorized officer prior to project authorization to minimize adverse impacts to other resource values. However, the BLM 3101 Manual suggests that any project relocation beyond 200 meters is likely to be inconsistent with the lease rights and therefore unreasonable.

Cultural resources management is authorized by a number of federal statutes including the National Historic Preservation Act (16 U.S.C. 470). Regulations (36CFR§ 60.4) promulgated under this act provide criteria for evaluating cultural properties to determine if they qualify for listing on the National Register of Historic Places due to their significance in American history, architecture, archaeology, engineering and culture. In Nevada 15% to 20% of cultural resources found during inventory are typically found to be eligible for listing on the National Register and thus worthy of consideration beyond initial recording. A property can be eligible on the national, state/regional or local level. The term "historic property" as defined at 36CFR§ 800.16(I) is used

here to describe any cultural resource that qualifies for listing on the National Register of Historic Places.

Four National Register criteria are applied when evaluating cultural resources. Criterion A is used to evaluate a property's association with events that have made a significant contribution to the broad patterns of our history. Examples of eligible properties are the California Emigrant Trail (national level) and Fort Ruby (local level). Criterion B relates to a property's association with the lives of persons significant in our past. Examples are the home of Thomas Jefferson (national level) and a store owned by a prominent Elko businessman (local level). Criterion C applies to properties that embody the distinctive characteristics of a type, period or method of construction, represent the work of a master or have high artistic value. Examples include a house designed by architect Frank Lloyd Wright, a Native American game drive and a bridge built by the Civilian Conservation Corps. Properties may be eligible under criterion D if they are likely to yield information important to history or prehistory.

The majority of eligible cultural resources in the Elko District qualify to the National Register solely under Criterion D and adverse effects can usually be avoided either through project relocation of 200 meters or less, or through data recovery because these properties are significant due to their data potential.

But the 200 meter relocation measures allowed by the oil and gas regulations may not be sufficient to avoid adverse effects to those relatively few cultural resources that qualify for National Register under criteria A, B and/or C. This is because such properties' significance may be in part due to their setting, feeling and association. For example an eligible segment of the California Emigrant Trail may lie in a valley where there has been little modern development and can provide the visitor a glimpse of the emigrants' experience. Placement of a production oil well or well field in the viewshed may substantially affect the setting, feeling and association of the trail. Movement of these facilities 200 meters or less often would do little to mitigate the effects. Another scenario would be a proposal to place an oil well or well field in an eligible historic mining town. In this case the allowable 200 meter relocation may not even get the facility outside of the town site let alone outside the viewshed.

Geophysical Exploration: The potential primary impacts to cultural resources are shared by all the cross-country, truck-supported seismic exploration (thumper, vibrator, spark ignition and surface/subsurface explosives) and, to a lesser degree, by non-vehicle supported surface explosives. This is the crushing/breaking, displacement and mixing of archaeological deposits, features and artifacts, and other cultural resources, by vehicle tires and tracks, or explosives. Similar impacts can be caused by the steel slabs, vibrator feet, and explosives used to create the seismic waves. The nature of the impacts can range from negligible to severe depending on the number and weight of the vehicles, the number of passes, soil types and conditions, and the nature of the cultural resources in the area of potential effect. Generally, for archaeological deposits, greater surface disturbance or soil compaction leads to greater impacts.

Cultural resources also could suffer impacts due to unauthorized artifact collection directly or indirectly associated with geophysical exploration. Direct impacts could result from illegal artifact collection by geoseismic crews who cover broad expanses of ground establishing the grids and laying out the cables necessary for data collection, and who usually know cultural

resource site locations because they are required to route around sites to avoid impacts. Indirect impacts could result when seismic trails are used by artifact collectors to access locations which previously had limited access. While difficult to quantify and prohibited by law, artifact collection resulting from geophysical exploration could substantially impact cultural resources as the "arrowheads", bottles and other artifacts/tools sought by collectors are also among the sources of data most critical for archaeological research and/or site interpretation. Because cultural resources are nonrenewable, artifact removal and other site damages would be an irretrievable resource loss.

Visual impacts (i.e. effects to setting, feeling and association) to cultural properties eligible under criteria A, B or C, caused by the intrusion of exploration vehicles, would usually be of short duration and usually not adverse. Exploration lines on-the-other-hand, could remain visible for decades in this desert environment (as evidenced by the 1970s and 1980s seismic lines still visible in the Elko District) creating long-term visual impacts. Multiple parallel lines could be the most visually intrusive.

Other long term impacts could occur if seismic lines are converted to use as roads. Impacts could result from continued driving over cultural resources and from deepening and widening of the roadbed within sites if use is heavy or certain conditions (powdery soil, excessive moisture) are present. Improved access could also result in damages such as long term artifact collection in previously remote sites and more indirectly like those caused from increased off-road recreation in areas away from the seismic lines.

Certain exploration actions can be exempted from cultural resource inventory. The cultural resource Protocol Agreement between Nevada BLM and Nevada State Historic Preservation Office (SHPO) provide that the following geophysical exploration actions may be considered categorically no adverse situations and may be excluded from cultural resource inventory requirements: 1) vibroseis and conventional truck-mounted shothole drill routes and operations located on constructed roads or well-defined existing roads and trails; 2) pedestrian routes and placement sites for hand-carried geophone, cables, or similar equipment; 3) cross-country operations of seismic trucks and support vehicles on frozen ground with sufficient snow depth (vehicle traffic does not reveal the ground) so as to prevent surface disturbance; 4) one time (single pass) routes of wheeled vehicles under 10,000 lbs GVW; 5) above ground seismic blasting (Poulter method); 6) helicopter-supported activities, including shothole drilling and above ground seismic blasting (Poulter method) in most areas, that do not require helicopter staging area preparation and vehicle use off of roads and trails; and 7) exploration activities defined as casual use in 43 CFR 3150. The preceding exemptions would not apply if cultural resources might be impacted such as: the use of surface blasting is near historic structures, using crews in areas with high densities of artifacts that might be illicitly removed, or using vibroseis trucks on a historic wagon road.

Exploration Drilling: The various actions involved in oil and gas exploration drilling could adversely impact cultural resources physically and visually. Impact types would be similar for all of drilling methods but the degree of impact could differ since some methods cause more earth disturbance than others. If drill pad or mud pit construction are not needed and scarification is not used to rehabilitate the pad then physical impacts would usually be crushing/breaking, displacement and mixing of archaeological deposits, features and artifacts,

and other cultural resources. Pad construction impacts could be more severe as constructed pads are usually larger than informal pads and substantial earth disturbance is usually required, potentially obliterating any cultural resources. Drilling fluid runoff could impact cultural resources away from drill pads by covering them with sediment or eroding cultural deposits.

Exploration pad construction and drilling activities could affect the setting, feeling and association of cultural properties eligible to the National Register under criteria A, B or C as discussed above under Lease-Sales. If the pad and associated facilities are abandoned and rehabilitated shortly after construction, these effects could be temporary and therefore not adverse if successfully rehabilitated. If the project goes to production visual impacts could be long term as discussed below.

Improved access and an increased human presence could result in illicit artifact collection and general deterioration of cultural resources. This type of damage would typically be concentrated around the drill site and access routes, and might be expected to be more likely to occur, or result in greater damages when extended drilling times are involved.

Road Construction and Use: Road construction, like the other actions involving substantial earth disturbance, can damage or destroy any cultural resources within the road corridor. A narrow road created by a single pass of the blade would be likely to do less damage, than a crowned and ditched road built to support heavy traffic. Cultural resources outside the construction corridor could be impacted by construction induced erosion.

Road construction and use could affect the setting, feeling and association of historic properties eligible to the National Register under criteria A, B or C as discussed above. The type of road, duration of use, nature of the historic properties, and visibility of the road from these properties would have to be considered in determining effects and developing mitigation measures. If the roads were to be abandoned and rehabilitated soon after construction, effects could be determined to be temporary and therefore not adverse, assuming the rehabilitated routes did not create a substantial long-term visual effect. If new roads were not closed and rehabilitated, visual impacts could be long term from both the intrusion of the road itself and from traffic using it.

Creation of new or improved access into areas which previously were difficult to reach could have substantial and long lasting adverse effects if cultural resources were present. A number of studies (Williams 1978, Lyneis et al. 1980; Nickens et al. 1981) have shown that that increased access leads to both intentional and incidental deterioration of nearby cultural resources. Nickens et al. (1981) found that most archaeological sites within 100 meters of improved roads exhibited evidence of vandalism and/or illegal collection. Sites at considerably greater distances also suffered damage but with less frequency as distance increased (Desjean and Wilson 1990; Ison et al. 1981; Nickens et al. 1981). With the advent of widespread ATV use in the last decade, we might anticipate that the spread of damage beyond new access roads may now be even greater especially since the Elko Field Office RMPs allows off-road use in most areas.

Development: Development of individual oil wells, oil fields would have the same types of impacts as exploratory drilling if cultural resources are present but potentially at a much greater scale simply because of the increased surface disturbance, additional facilities, longer

period of use, and less opportunity to effectively redesign/relocate the fields to avoid impacts. The types of potential impacts depend on many factors including the location of the oil fields, the nature of the subsurface oil/gas reservoirs, the number and type of cultural resources present, and the geography.

Physical impacts from the clearing, leveling, cutting and filling for the drill pads, tank batteries, internal pipelines and other facilities could damage or destroy cultural resources located within the construction zones. As a rule, moving an oil field so as to avoid historic resources would not be feasible, but relocating and rerouting of the facilities within a field to avoid direct physical impacts could be possible. However, such actions may be insufficient to avoid the effects of incidental and intentional human actions (e.g. running equipment through sites, artifact collecting, etc.) or unanticipated secondary effects of the development such as erosion or oil spills.

The earth disturbance, facilities and traffic required by oil and gas development and operation could substantially impact the setting, feeling and association of any nearby historic properties eligible to the National Register under Criteria A, B and C by introducing visual and noise elements that are out of character with the particular resource. Intrusions could range from minor, if the historic property is some distance from the development or is screened by the topography, to overwhelming if a small resource such as a cabin were to be surrounded by a well field and associated facilities.

Because this analysis is for leasing activities rather than any specific ground disturbing proposal, it is not usually possible to anticipate which cultural resources might be affected. The one known exception is the 1875 Eureka Palisade Railroad grade that runs the length of Pine Valley. Pine Valley contains the only producing oil wells in the Elko District and has high potential for future development. Consequently, the possibility of visual effects to this resource from oil and gas exploration and development must be considered quite high.

Power Lines: Power line installation and maintenance would cause earth disturbing activities at the pole locations, along access routes and at staging areas. All of these could physically impact cultural resources. The amount of disturbance depends on the size of the line. Single pole lines might only require cross country travel and drilling of pole holes without preparing a pad. The greatest damage could be from long-term use of the access route for line inspection and maintenance, and as an access route by the public.

Due to their height and visibility power lines could affect the setting, feeling and association of historic properties eligible to the National Register under Criteria A, B and C.

Pipelines: Pipelines could be installed on the surface or buried. Both methods could adversely impact cultural resources by obliterating surface and shallow buried manifestations of archaeological and historic sites. Buried pipelines also have the potential to affect deeply buried archaeological deposits.

Surface pipelines could have long-term visual effects for some historic properties, while visual effects from buried pipelines might be of shorter duration if the line and access road are rehabilitated and revegetated.

Rehabilitation/Abandonment: Rehabilitation and abandonment of trails, roads, pads and other facilities associated with oil and gas exploration and development could effect cultural resources, but usually not to the degree of the earlier project phases. Positive effects could be lessening or removal of project induced visual intrusions into settings of historic properties. Adverse impacts could result if new ground containing historic properties would be disturbed during leveling, recontouring, ripping or other types of rehabilitation. As a rule, special protective measures established in the proposed action for construction, would suffice for the rehabilitation/abandonment phase.

Most cultural properties tend to degrade over time due to natural forces but many survive for thousands and even millions 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 decscribed above would be mitigated through implementing protective measures as part of standard operating procedures and attached stipulations if production is approved. 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 can be controlled. Taken together with other uses of the public lands, fluid mineral exploration would contribute to an overall decline in cultural resources.

Mitigation

Most adverse effects to cultural resources would be mitigated through project redesign, relocation, or in some cases of historic properties eligible for their research potential, through data recovery. Direct physical impacts would usually be avoided by project reroutes and redesign. Buffers would be established between historic properties and proposed projects to mitigate potential direct and indirect impacts. Width of buffers would be determined project by project based on the type of historic properties present and the anticipated impacts. Using Nickens' (1991) data, buffers between historic properties susceptible to illicit artifact collection/vandalism and new or improved road access should be at least 100 meters (328 feet). Narrower buffers could be acceptable in cases where artifact collection/vandalism is not a significant concern, where there would be a physical barrier between the project and the historic property or an archeologist monitors construction. Wider buffers could be necessary if erosion or other impacts were anticipated. Although not always logistically possible, buffers between historic properties and drill pads and production facilities should be at least 100 meters due to the increased human presence and increased impact potential.

Due to the technical requirements of geophysical data gathering and lower anticipated cultural resource impacts, buffers between seismic drivelines and historic properties would generally be less than other geophysical projects, but usually at least 10 meters.

While avoidance measures and buffers may lessen the degree of incidental and intentional impacts to historic properties, other measures would also be required if warranted. Among these is a stipulation requiring the proponent to ensure their actions or the actions of their employees, contractors or anyone else associated with the project do not intentionally or inadvertently

adversely impact historic properties. Should unanticipated or unauthorized impacts occur, the proponent would be responsible for taking steps to eliminate the action causing the impact, and for the cost of repairing/stabilizing damaged properties and/or undertaking appropriate data recovery.

If historic properties susceptible to impacts attributable the project are located near or within long term facilities such as oil fields, or associated access roads, photographic documentation and establishment of base maps followed with periodic monitoring by an archaeologist funded by the proponent would be required to ensure that these historic properties are not deteriorating.

Another mitigation measure would be to involve the proponent and their employees in site protection. Such measures could range from employee education to reporting of unauthorized artifact collecting,

If adverse effects to properties eligible for their archaeological data or other information potential cannot be effectively mitigated by other means, data recovery, in conformance with the *Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716), would be conducted.

Mitigating adverse project effects to historic properties eligible to the National Register of Historic Places under Criteria A, B and C, when the settings, feelings and associations are important, could be more difficult than for archaeological sites where only physical damage is a concern. Much would depend on the existing viewshed, the type of project involved, surrounding terrain and the distance between the project area and the historic property. If a property is located in an area of substantial modern development, then construction of a drill pad could be so minor an impact given the already severely compromised viewshed that no mitigation would be required.

Relocating projects to use terrain or vegetation as a screen would be used where possible. Project redesign, such as using low profile storage tanks or painting facilities to blend with the landscape, would be also be used to lessen impacts. Planting of vegetative screens might be applicable in some situations. Adverse effects could be offset by measures such as detailed photographic, graphic and descriptive documentation of a property, or developing interpretive panels and pamphlets/publications. In cases where impact mitigation were not possible using the preceding methods, project specific analysis would be required to determine if the impacts are such as to warrant modification of the proposed activity or if an adverse effect would be accepted.

Prior to commencing abandonment/rehabilitation, the proponent and BLM project lead would insure that these actions would be done in compliance with any project-specific cultural resource avoidance measures. Best management practices would be implemented to minimize impacts to cultural resources.

3.2.4 Soils

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. Oil and gas exploration and development could take place on any of these soil types. Detailed soil information is available in the eight published soil surveys that are 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

Total disturbance from oil and gas exploration and development in the Elko district would be about 1,359 acres over the next fifteen years. 744 of these acres would be reclaimed during the projected time period. These estimates assume that roads will 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.

Cumulative impacts to soils will result from oil and gas leasing as well as a number of other land uses as outlined in land use plans. Activities that affect soils on public lands include but are not limited to mining, grazing, and recreation. Impacts from all of these activities are expected to increase in intensity for the foreseeable future.

Mitigation

Best management practices along with specific restrictions would be implemented to minimize soil erosion and facilitate vegetation recovery.

3.2.5 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 can 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 insure compliance with pollution control requirements. Total Maximum Daily Loads (TMDL's) are an assessment of the amount of pollutant a water body can receive and not violate water quality standards. These requirements are implemented by the Nevada Division of Environmental Protection (NDEP) in compliance with CWA 303(d). Impaired water bodies are defined as those that do not meet TMDL requirements. The most recent 303(d) list was published in 2004 and includes many water bodies within the Elko District.

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

Effects

The initial action of oil and gas 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. Area covered by the December 2005 oil and gas lease sale 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 oil and gas exploration and development can have an impact on these and other water resources:

Soil Disturbance: Soil can be disturbed through exploration drilling as well as construction and/or operation of facilities, fences, pipelines, gravel pits, transmission lines and roads. Additional disturbance may 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 can 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 can fail affecting surface or ground water. In order to lessen chances of infiltration, pits can be lined with bentonite, plastic, or other synthetic liners. Even when precautionary procedures are followed there is possibility of contamination.

Facility Operation: Pumps, tank batteries, pipelines, and heater treaters are all sources of potential petroleum spills. Once this material is on the soil surface it may become a problem for surface water quality as runoff occurs. Overland runoff resulting in the addition of petroleum products to water resources leads to toxic contamination (harmful metals and chemicals) and non-toxic contamination (organic enrichment and turbidity). Infiltration of petroleum products could also lead to toxic contamination of groundwater.

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

Cumulative impacts to water resources will result from oil and gas leasing over the next 15 years as well as a number of other land uses as outlined in land use plans. Activities that affect water quality on public lands include but are not limited to: mining, grazing, and recreation. Impacts from all of these activities are expected to increase in intensity for the foreseeable future.

Mitigation

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

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

3.2.6 Air Quality

Existing Conditions

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 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 by the federal government and the state of Nevada. Air quality limits must not be exceeded where the general public has access.

Effects

The following activities related to oil and gas development can have an impact on air resources:

Soil Disturbance: Soil disturbance from: construction and/or operation of facilities, fences, pipelines, gravel pits, transmission lines and roads can cause fugitive dust and

negatively affect air quality. Blowing dust can also cause a safety hazard if it occurs near transportation routes. Additional problems may occur during reclamation.

Facility operation: The presence of petroleum products on pumping rigs is a fire hazard as well as a source of harmful gaseous emissions. Fires can pose a temporary impact on air quality. Probability of measurable decrease in air quality from gaseous emission is low but possible especially if development becomes highly concentrated in any particular area.

Mitigation

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

3.2.7 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 can be found in the Elko and Wells RMP EISs and the EA for the 2004 Fire Management Amendment to the RMPs and will not be repeated here. 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, as well as in Great Basin Restoration Initiative and aquatic and terrestrial wildlife habitat improvement projects to enhance present communities to meet rangeland health standards.

Effects

The initial action of oil and gas leasing does not affect vegetation resources. However, surface disturbing activities for exploration and production will affect vegetation resources. Activities such as well pad construction, fence construction, development of roads, pipeline construction, facility construction and powerline construction will lead to the removal of vegetation and run the risk of being invaded or dominated by cheatgrass or other invasive annual weeds. As projected by the Reasonably Foreseeable Development scenario, a total of 1,360 acres are anticipated to be disturbed throughout the Elko District during the exploration and development of oil and gas resources over the next fifteen years of which approximately 744 acres will be reclaimed. This will result in a net loss of 616 acres of vegetation during the fifteen year projection. Eventually all the acreage will be reclaimed and revegetated. In the long term, seeding is used in the reclamation process to provide a more desirable plant community of native forbs and grasses. Often, an abandoned well location is seeded and fenced as an exclosure to protect the vegetation as it is being established. The protective fence is normally temporary and will be removed once reclamation is completed. A more detailed analysis of impacts to vegetation resources will 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. Therefore, the cumulative impacts to vegetation resources related to leasing activities are not considered substantive. Impacts to vegetation as a result of future actions would be analyzed on a case by case basis as exploration and development permits are proposed.

Mitigation

All seed used for reclamation on public lands will meet standards existing at the time of the proposed application. (See also section on invasive, non-native species, 3.2.18. This standard is expected to evolve as more is learned about invasive weeds.) Best management practices along with specific restrictions would be implemented to minimize negative effects to vegetation communities.

3.2.8 Livestock Grazing

Existing Conditions

Livestock grazing throughout the 7.2 million acres of public lands in the Elko district has been allocated for 726,416 Animal Unit Months (AUMs-the amount of forage consumed in a month by a cow and calf or five sheep). The total permitted use is distributed among 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.

Effects

The initial action of oil and gas leasing does 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 136 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 is established (two to five years). The vegetation would soon recover and be available for consumption by livestock and wildlife. Thus, the estimated total net loss of forage during the fifteen year plan is equivalent to approximately 62 AUMs.

Short term disturbance to livestock grazing could occur during exploration and development phases. This may include livestock avoiding certain areas due to traffic, drilling, and construction of facilities such as powerlines and pipelines. This disturbance will be limited to the short term and will not cause a major impact to livestock distribution. Because of the usually dispersed nature of activity, reclamation of disturbed sites, and varying degrees of damage to vegetation, reduction in licensed use has not been required. High concentrations of surface disturbance on one or a few grazing allotments could lead to reductions in livestock grazing on those affected allotments, if the issue is identified in the allotment evaluation process.

Mitigation

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

3.2.9 Forest Resources

Existing Condition

Forest resources exist on some of the lands proposed for leasing within the District. The forest resource species are pinyon, juniper, aspen, and mahogany. Most oil and gas exploration occurs in valley floors, usually away from forested areas. The Wells Resource Areas has more forested areas, but also is believed to have less potential for oil and gas exploration and development activity.

Effects

Impacts to forest resources as a result of the exploration, development, production or abandonment of oil and gas 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.

Mitigation

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 will 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 will be removed from federal land unless otherwise directed. A wood permit from BLM for the wood removed (for the appraised value) could be required prior to any clearing. Best management practices along with specific restrictions would be implemented to minimize negative impacts to forest resources.

3.2.10 Wilderness Study Areas

Existing Conditions

The Elko District contains 10 Wilderness Study Areas (WSAs) covering 272,422 acres. These include the Badlands, Bluebell, Cedar Ridge, Goshute Peak, Little Humboldt River, Owyhee Canyon, Red Spring, Rough Hills, South Fork Owyhee River and South Pequop WSAs. Land management prescriptions are applied according to BLM Manual Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review. No new leases may be issued on lands under wilderness review.

The Wilderness Act of 1964 described for wilderness management the following passage from Section 2(c) of the Act:

> A wilderness ...is an area where the earth and community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions...

Section 603(a) of FLPMA directed the Secretary of Interior to inventory and study remaining roadless areas of 5000 acres or more to determine which areas possess wilderness characteristics, as described in the Act of 1964. The Secretary was further directed to report to the President his recommendation as to the suitability or nonsuitability of each area for preservation as wilderness. In 1991, the Nevada BLM completed a Wilderness Study Report which contained recommendations for wilderness or non-wilderness designation for each of the WSAs. Congress has the final determination on whether a WSA will be designated as Wilderness or released from study and back to multiple use.

Effects

No effects, due to the fact that WSA are excluded from leasing. Land management prescriptions for WSAs are applied according to BLM Manual Handbook H-8550-1, Interim Management Policy for Lands Under Wilderness Review. The Nevada BLM memorandum dated September 24, 2004 (IM No. NV-2004-093) also establishes that "*we will offer and issue fluid mineral leases to within one quarter mile of a Wilderness or WSA boundary. Any quarter-quarter sections intersected by and including a portion of a Wilderness or WSA boundary will be excluded from the parcel nominated.*" As noted on page 7, portions of Parcel No. 457 totaling 80 acres have been excluded from the proposed December 2005 sale to avoid impacts to the Cedar Ridge WSA.

Mitigation

None

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

The initial action of oil and gas leasing does 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 may cease using areas for recreation because of oil and gas 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 oil and gas development, new routes may be created as a result of fence construction, powerline construction and pipeline construction. In general, new routes lead to greater access for recreationists. 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 causing another public safety concern.

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

Mitigation

The Stipulations in Appendix B 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 SOP also prevents surface occupancy within this high use area. Using best management practices will lessen the impacts to dispersed recreationists.

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 horizon 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.

Man made features in the Elko District range from highways and powerlines to fences, roads, and range developments. There are many man-made features; some more dominant than others depending on your 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.

According to the map of the Elko District Petroleum Potential, much of the "High Potential" Oil and Gas area is in VRM Classes III and IV. Class III designation was given to the more mountainous regions, while the valleys were given Class IV designations. The following are definitions of each Class on the Elko District.

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 may 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 may 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 may 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 can 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.

In addition to the above Classes, in the Elko and Wells Resource Management Plans, a Low Visibility Corridor was established along I-80. Visual impacts are to be minimized within 1.5 miles on either side of the highway. Within this three-mile wide Low Visibility Corridor, the objective is for management actions not to be evident in the characteristic landscape. Management objectives for Class II VRM areas will be used as a guideline when evaluating projects within the Low Visibility Corridor. The table at the end of chapter 2 identifies those leases proposed to be offered at December 2005 sale where the I-80 Low Visibility Corridor stipulation would need to be attached.

Effects

Currently when a lease is offered an analysis is done to determine which VRM Class the development falls under using the established inventory 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 Oil and Gas resources would create strong contrasts between the project features and the existing landscape. All the dominance 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 steel storage tanks would cause substantial contrast to form, line, texture and potentially to color as well. Essentially, there are very few structures present in the "High Potential" Oil and Gas area and the proposed 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 is fairly long. Grasses can 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), it still would conform to the Class III and IV Visual Resource Management objective for the "High Potential" Oil and Gas area.

Under the assumption that a number of wells would be drilled and that they would be successful, substantial changes in the visual landscape would result over the next 2-5 years.

Mitigation

In spite of the fact that most of the "High Potential" 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.

The SOP for the I-80 Low Visibility Corridor would limit visual impacts within 1.5 miles of either side of I-80 using Class II standards.

3.2.13 NativeAmerican Concerns

Existing Conditions

Located within the 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 Gosuite of Utah, Yomba Shoshone, and various other community members and groups.

Initial coordination/communication efforts were made to most 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. Regarding this specific proposed action, December 2005 Oil and Gas Lease Sale, the Te-Moak Tribe of Western Shoshone (including the Elko Band) and the Western Shoshone Committee of the Duck Valley Sho-Pai Tribes of Idaho and Nevada remained the most active.

As a result of the various phone, fax, email, meeting, and letter communications, specific lease sale parcels were identified as being in conflict with certain tribal interests. In a September 1, 2005, letter to the Elko BLM Field Office, and during prior meetings with tribal representatives, the Te-Moak Tribe of Western Shoshone, along with the Elko Band, identified conflicting lease sale parcels. Having been provided the December 2005 Oil and Gas Lease sale map, the following list of conflicting lease sale parcels were submitted to the Elko BLM Field Office:

"The areas of Lease C (3 each enclosed), 039-040, Lease H. (2 each), 151, Lease G. 086 (3 each), 088, 089, 084 (within reservation) 118 and 114 (within reservation)."
As discussed in section 2.3 (Alternatives Considerated but Eliminated from Further Consideration), some of the parcels were removed. The numbers of parcels that are still part of the proposed sale were changed from those used during scoping. The original parcel numbers they referenced (vs. the new #s assigned) are: H (# 594), 151 (705), G (522), 086 (#515), 088 (#517), 089 (#518), 084 (# 514, within reservation), 118 (#592) and 114 (within reservation)." Due to the existence of lease stipulations and limitations (law, regulations, directives), BLM has determined that other parcels requested to be deferred or withdrawn by the Te-Moak Tribe, should be offered in the December 2005 Oil and Gas lease sale.

The tribal issues/concerns with the above lease sale parcels are as follows: Lease sale parcels in the Spruce Mountain area are within critical mule deer and pronghorn antelope wintering grounds and also contain antelope traps, both of which assist in maintaining the Native peoples' spiritual and cultural integrity. Those lease sale parcels near the Elko BLM Field Office's southern administrative boundary, within and around the Roberts Mountains, contain the traditional pine nut harvesting areas and camps of families from many tribes (prehistoric, historic, and contemporary). Certain areas within the Robert's Mountains have been excluded from Commercial Pine Nut Harvesting, as a result of extensive tribal use, by the BLM Battle Mountain Field Office.

Certain parcels to be made available for lease in the December 2005 sale are also elements of the Te-Moak Tribe's land acquisition/identification package. Te-Moak Tribal Leadership has requested the Elko Field Office BLM Management team to withdraw or defer those lease sale parcels noted in the attachment to the Te-Moak Chairman's September 1, 2005, letter.

Effects

Although the act of selling oil, gas leases does not authorize any exploration, development, or production, or any other related ground disturbance activities, there does exist the potential to adversely impact Native American sites of spiritual/cultural/traditional nature (indirectly). If a lease is sold, the lessee does retain irrevocable rights and can foreclose the authorized officer's use of some mitigation measures. For example, 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 statues and lease stipulations. Although the act of issuing a lease itself does not pose an immediate physical threat to tribal resources or cultural/traditional/spiritual use sites and activities, any subsequent proposal to explore or develop may potentially cause a direct adverse impact.

It has been expressed that the issuing of a lease within culturally sensitive areas (Spruce Mountain - wildlife and antelope traps - and Roberts Mountain – pine nut harvesting areas) may later compromise the future use (possible future impacts to physical and thus spiritual integrity) of such sites by community members.

It is also the belief of tribal representatives that the issuing of a lease within tribally identified future land expansion areas may complicate the land acquisition process, thus negatively impacting the welfare of existing and future tribal community members.

Mitigation

Both oil and gas leasing and development are recognized and acceptable uses of lands administered by the BLM under the Federal Land Policy and Management Act of 1976 (FLPMA). However, in accordance with the National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007, the BLM must also provide affected tribes an opportunity to comment and consult on proposed actions. BLM must attempt to limit, reduce, or possibly eliminate any negative impacts to Native American traditional/cultural/spiritual sites, activities, and resources.

Due to the existence of additional Standard Operating Procedures (SOPs) and stipulations and limitations (law, regulations, directives), BLM has determined that parcels requested to be deferred or withdrawn, by the Te-Moak Tribe, will remain in the December 2005 Oil and Gas lease sale (see WO IM 2005-003).

The act of Oil and Gas leasing itself, does not directly impact cultural/traditional resources and sites within the lease sale parcels. Issuing a lease does not obstruct or limit traditional/cultural/spiritual use or bar access to. As stated above, if, as a result of leasing, a ground disturbing plan to explore or develop is submitted to BLM, all applicable laws, regulations, directives, SOPs, and stipulations and limitations will apply.

BLM reserves the right to deny or alter proposed activities associated with any surface occupancy that results from Oil and Gas leasing. Consequently, the BLM must take steps to identify locations having traditional/cultural or religious values to Native Americans and insure that its actions do not unduly or unnecessarily burden the pursuit of traditional religion or traditional lifeways.

In the past, Elko BLM has deferred certain leases parcels that were also part of the tribe's draft land acquisition package to be sent to the Nevada Congressional Delegation. However, BLM has not received any formal notification stating that their land acquisition package has been sent to the Nevada Congressional Delegation or is currently being reviewed. Therefore, BLM cannot continue to withhold or defer lease parcels, identified as being available for Oil and Gas lease sale any longer, based on tribal land acquisition/expansion efforts that have not been submitted to the Nevada Congressional Delegation.

However, the issuing of a lease within lands identified for future tribal acquisition or expansion does not bar or obstruct the tribes' land acquisition process, since the tribe has determined that they will take the "Congressional route." Congress would then make the ultimate land transfer decision (regardless of the lease status within a parcel), which BLM would follow.

3.2.14 Wild Horses

Existing Conditions

There are 8 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 Diamond Hills North HMA is within the High Potential Area and the other seven HMAs are in the Low or Very Low Potential for oil and gas exploration. Parcels 413 to 420 and 751 to 778 include lands that fall within a wild horse HMA.

Effects

Future exploration could affect 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 facilties could disrupt movement of free roaming wild horses and animals could be injured by colliding if any new fencing occurs.

Mitigation

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

3.2.15 Invasive, Nonnative Species

Existing Conditions

Invasive, nonnative species occur in some areas which have the potential for oil and gas 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. Wildland fires in the northern Great Basin have increased 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. Vehicles are a primary vector in the spread of invasive weed species. Seeds and plant propagules can become lodged in tires and undercarriages and deposited in relatively weed free areas. Increased traffic from users of public lands may cause an increase of noxious and/or invasive plant species.

Trout Creek, Mary's River, 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.

For the currently proposed lease sale, parcel #s 543, 586 and 587 fall within the high probability area, and parcels 588, 589 - 593, 596, 650, 655, 702 - 724, 745 and 746 fall within the intermediate probability area.

Effects

There are numerous springs and drainages within the high potential and intermediate potential oil/ gas areas. Initial leasing of oil & gas parcels will not have a direct effect on these riparian resources, but initial surface disturbing activities of oil/ gas exploration and facility construction of lease parcels may occur within the vicinity of a spring or stream riparian area. The impacts may 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 can 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 impacts that have the potential for riparian habitat removal or degradation in combination with other actions in the area will have to be evaluated at the time the permit application is submitted.

Normal oil/ gas 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 can have variable effects on the riparian community, depending on the water quality. Increased moisture in drainages can accelerate riparian plant establishment, changing the existing vegetative composition. Temperatures of discharge waters are usually high and algae and/or moss production can increase as a result of such water entering any standing water bodies. Additional monitoring measures may 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 will be disturbed for oil/ gas drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas. Monitoring or remediation measures to reduce possible impacts to riparian areas should be established at the time of the APD submittal.

Of the parcels nominated for the December sale, many of the riparian areas have been rated for functionality and fall within a nonfunctioning of downward trend category (3.2.16 Table 1). As such, these areas are more susceptible to disturbance activities.

A number of the parcels proposed for the December 2005 sale contain Nevada designated noxious weed species. Species found within the parcels include Scotch thistle (*Onopordum acanthium*), spotted knapweed (*Centaurea maculosa*), hoary cress (*Cardaria draba*), Russian knapweed (*Acroptilon repens*), perennial pepperweed (*Lepidium latifolium*) and Canada thistle (*Cirsium arvense*).

Parcel #	Noxious Weeds Species Present
NV-05-12	Scotch thistle
NV-05-12-413	Scotch thistle
NV-05-12-415	Scotch thistle
NV-05-12-423	Spotted knapweed
NV-05-12-434	Scotch thistle, hoary cress
NV-05-12-457	Hoary cress, Russian knapweed
NV-05-12-460	Scotch thistle
NV-05-12-462	Perennial pepperweed
NV-05-12-463	Perennial pepperweed, Scotch thistle
NV-05-12-469	Canada thistle
NV-05-12-511	Scotch thistle
NV-05-12-515	Hoary cress, Russian knapweed
NV-05-12-526	Scotch thistle
NV-05-12-527	Scotch thistle, Canada thistle, hoary cress
NV-05-12-533	Scotch thistle
NV-05-12-535	Scotch thistle
NV-05-12-536	Scotch thistle
NV-05-12-539	Hoary cress
NV-05-12-586	Canada thistle
NV-05-12-599	Scotch thistle
NV-05-12-606	Hoary cress
NV-05-12-711	Hoary cress
NV-05-12-717	Scotch thistle, perennial pepperweed
NV-05-12-745	Scotch thistle
NV-05-12-749	Scotch thistle
NV-05-12-775	Scotch thistle
NV-05-12-777	Scotch thistle

Effects

The construction activities associated with the development of oil and gas exploration have the potential to create invasions or spread existing infestations. Road construction that may be necessary to implement oil & gas exploration/development may cause invasion or spread of invasive, nonnative species. The level of disturbance is proportional to the likelihood of invasion/spread. Implementation of mitigation measures would help to minimize the impact to invasive, nonnative species. Some of the species present in the listed parcels reproduce vegetatively and through seed production, such as Russian knapweed, hoary cress and Canada thistle. Ground disturbance of these species tends to cause an increase of these species.

Mitigation

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

Use of current standards for seed used to reclaim public lands would be helpful in reducing the spread of invasive, non-native species. Best management practices along with specific restrictions would be implemented to minimize the spread of invasive, non-native weeds.

3.2.16 Wetlands/Riparian Zones

Existing Conditions

The Elko Field Office administers 63,000 acres of BLM wetlands associated with springs, seeps and wet meadows (5,500 acres, Map 1), areas along the banks of streams (14,000 acres associated with 450 stream channel miles, Map 2) 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 motorized vehicle recreational activities.

There are a number of lotic and lentic riparian systems within the high and intermediate potential oil & gas exploration and development areas (Map 3, 4). Within the areas of high or moderate probability for development of oil or gas resources, which encompasses about 350 miles, or an estimated 53,457 acres (the cumulative effects analysis area), some data is available on the condition and uses affecting approximately 30 important perennial stream habitats,

Data on functioning condition of seeps and springs on public lands was collected in 2003 for areas within the cumulative effects analysis area (Table 1). Spring riparian areas are highly important for wildlife use.

Habitat conditions for streams on public lands in the cumulative effects area are highly variable and depend largely on management initiatives. Some of the more important streams such as

Trout Creek, Mary's River, 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.

For the currently proposed lease sale, parcel #s 543, 586 and 587 fall within the high probability area, and parcels 588, 589 - 593, 596, 650, 655, 702 - 724, 745 and 746 fall within the intermediate probability area.

Effects

There are numerous springs and drainages within the high potential and intermediate potential oil/ gas areas. Initial leasing of oil & gas parcels will not have a direct effect on these riparian resources, but initial surface disturbing activities of oil/ gas exploration and facility construction of lease parcels may occur within the vicinity of a spring or stream riparian area. The impacts may 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 can 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 impacts that have the potential for riparian habitat removal or degradation in combination with other actions in the area will have to be evaluated at the time the permit application is submitted.

Normal oil/ gas 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 can have variable effects on the riparian community, depending on the water quality. Increased moisture in drainages can accelerate riparian plant establishment, changing the existing vegetative composition. Temperatures of discharge waters are usually high and algae and/or moss production can increase as a result of such water entering any standing water bodies. Additional monitoring measures may 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 will be disturbed for oil/ gas drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas. Monitoring or remediation measures to reduce possible impacts to riparian areas should be established at the time of the APD submittal.

Of the parcels nominated for the December sale, many of the riparian areas have been rated for functionality and fall within a nonfunctioning of downward trend category (3.2.16 Table 1). As such, these areas are more susceptible to disturbance activities.

396	X		725	X	
415	X		729	X	
413	X		597	X	
481		X	525		X
460		X	464		X
527		X	540		X
426	X		600	X	
476	X		601	X	
526	X		606		X
722	X				

Mitigation

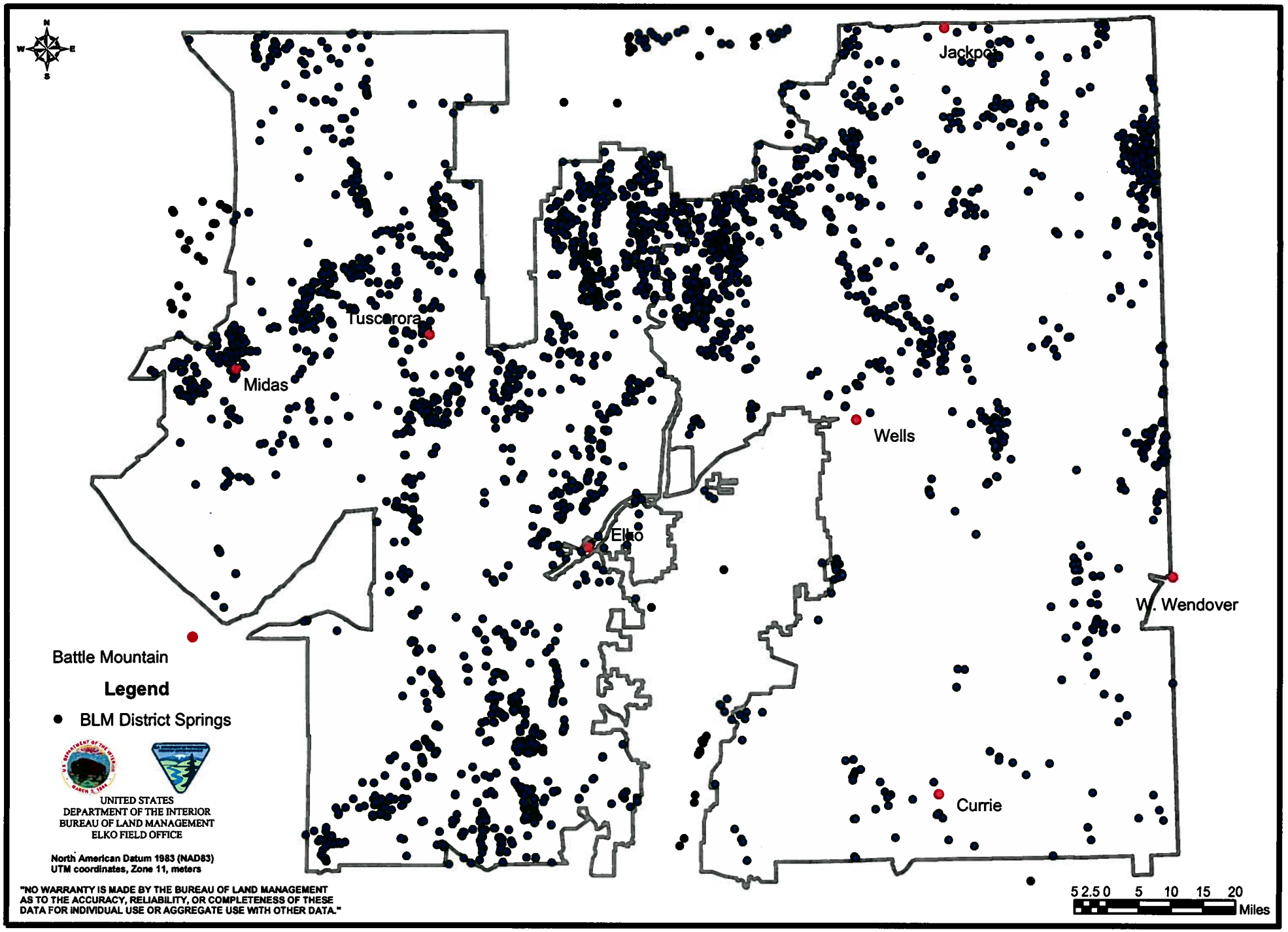
Executive Order 11990, May 24, 1977, directs federal agencies to take appropriate actions to avoid, to the extent possible, long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid new construction in wetlands wherever there is a practicable alternative.

Exploratory drilling and road building would be restricted to 15% slopes or less in canyons of perennial streams. The important beneficial impact would be to prevent deterioration of riparian habitat due to sedimentation. The effect of such a restriction on oil and gas/geothermal development would mean that high elevation drilling would be done near ridgetops and on benches, well away from streams that were also on slopes 15% or less (Elko RMP, ROD).

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 may be greater as determined by the Elko BLM Field 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. Best management practices along with specific restrictions would be implemented to minimize negative impacts to riparian resources.

Oil & Gas EA
Lentic Areas in the Elko District

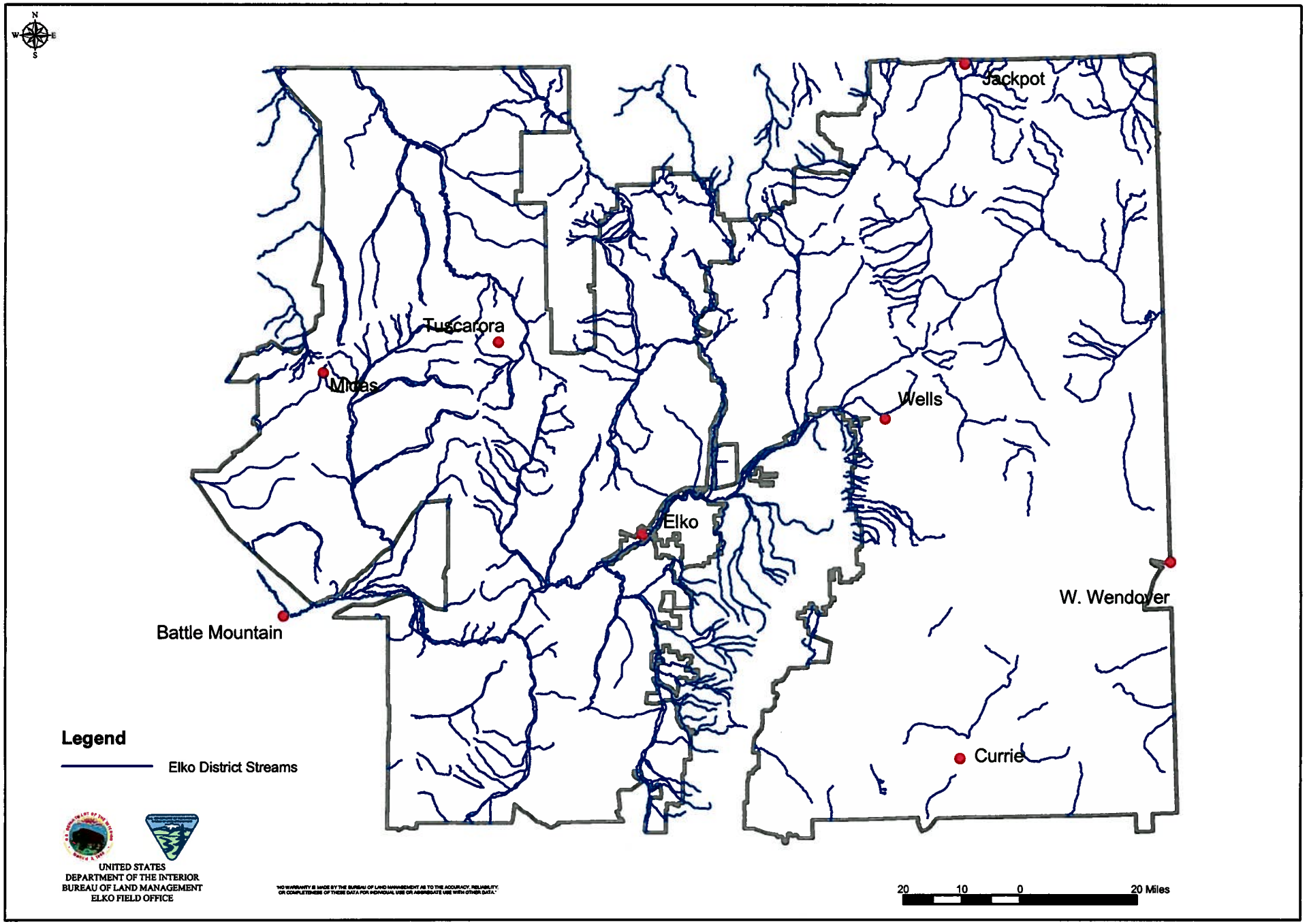
3.2.16 Map 1



Oil & Gas EA

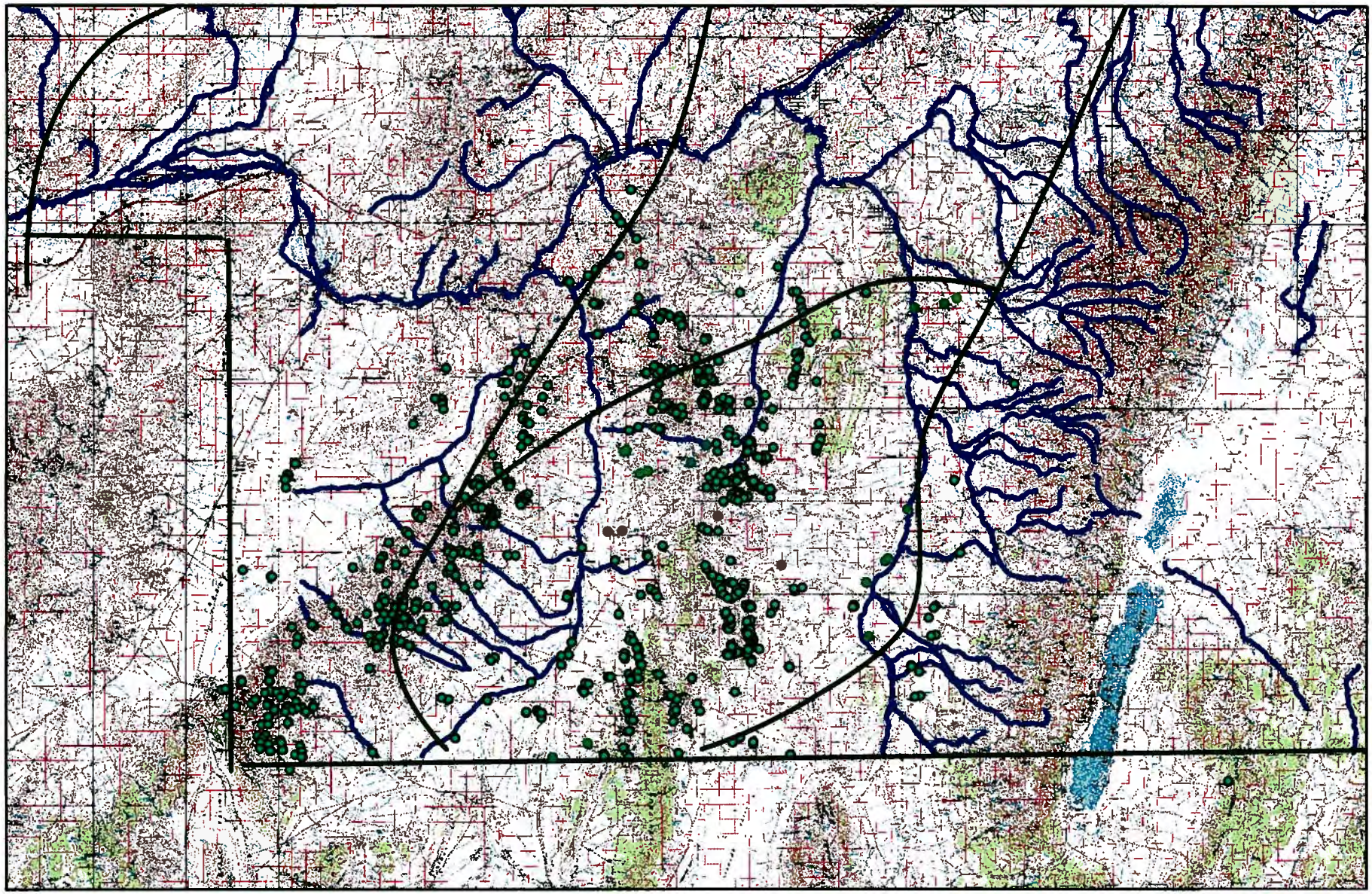
Major Lotic Areas in the Elko District

3.2.16 Map 2



Oil & Gas EA
Springs and Major Streams in High Potential Area

3.2.16 Map 3



Legend

streams

springs

0 1.5 3 6 9 12 Miles

Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

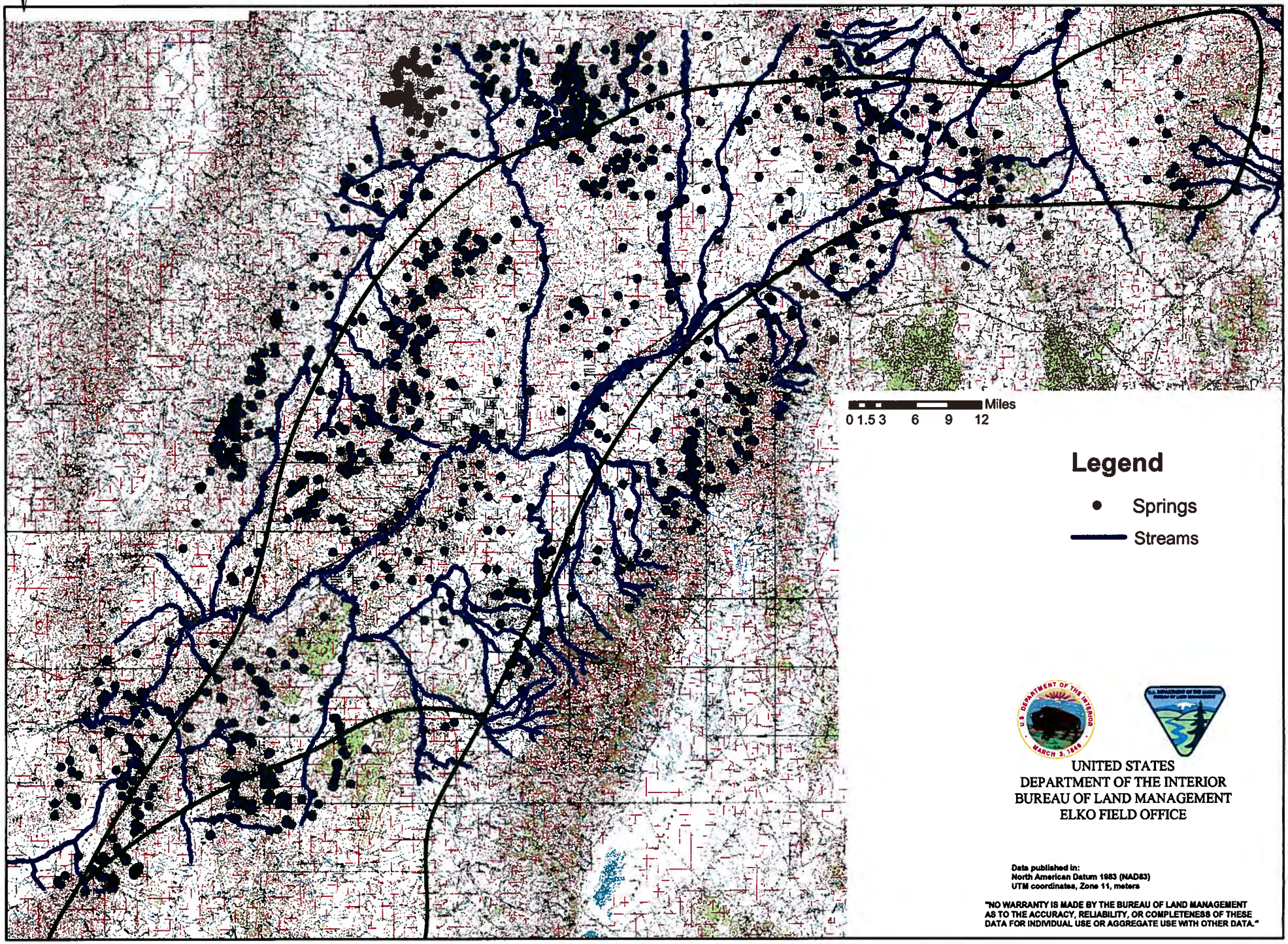
"NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA."

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ELKO FIELD OFFICE

Oil & Gas EA

Springs and Major Streams in Intermediate Potential Area

3.2.16 Map 4



3.2.17 Fisheries

Existing Conditions

The Elko Field Office administers approximately 450 perennial miles of stream that has the potential to harbor a variety of fish species, including approximately 23 game species and 21 non-game species.

3.2.17 Table 1: Elko District Fish Species

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

Source: Nevada Department of Wildlife (NDOW 2005).

There are numerous drainages within the high potential and intermediate potential oil/ gas areas that have the potential for permanent or seasonal fish habitat (3.2.16 Maps 3, 4). Individuals in a population that reside at higher elevations will not likely be affected by oil and gas exploration that occur in valley floors. Oil and gas exploration and development do have the potential to degrade, displace or destroy fish populations at lower elevations 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 APD is submitted. Fisheries resources occupying larger aquatic habitats (e.g., streams, rivers, reservoirs, and marshlands) could be adversely affected increased activity in riparian systems (e.g., road construction, disturbances that create barriers to movement, increase erosion, sedimentation, reduce habitat heterogeneity, etc.) and by degrading water quality (thermal or chemical) or quantity. Spring-dwelling populations could be affected by these factors in addition to alterations in discharge and thermal characteristics that could occur as a result of groundwater extraction. Road construction could also increase access into areas that are currently remote, which could allow additional legal and illegal take of sport fish. Increased access could also result in unwanted introductions of non-native species into remote habitats.

Effects

Initial leasing of oil & gas parcels will not have a direct effect on these fisheries resources, but initial surface disturbing activities of oil/ gas exploration and facility construction of lease parcels have a probability of occurring within the vicinity of a stream or streams with resident fish populations. The impacts may include reduced or lost riparian vegetation; 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 (Geothermal), and fish mortality or displacement due to any activity with the potential to decrease or degrade viable habitat. Increases in sedimentation 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 has viable fish habitat may pass through the same vicinity. Exploration or construction impacts that have the potential for fish mortality or fish habitat degradation will be evaluated at the time of the APD submittal.

Normal oil/ gas plant operations can 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. Spills of toxic substances, such as crude oil and production fluids, can degrade water quality for a period of time depending on the amount and toxicity of the particular contaminant. The sensitivity of fish populations in drainages located near proposed drill sites will be determined at the time of the APD submittal and where appropriate, limitations and/or monitoring will be imposed.

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 will be disturbed for oil/ gas drilling purposes. Reclamation of facilities should only result in transient effects on riparian areas. Monitoring or remediation measures should be established at the time of the APD submittal that will reduce possible impacts to drainages inhabited by fish populations.

Of the parcels nominated for the December 2005 sale, many contain the threatened Lahontan cutthroat trout, which are discussed in the section on Special Status Species (3.2.19). Parcel # 380 contains other native game fish.

Mitigation

The Elko RMP Record of Decision, page 37, cites BLM policy 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). Additional monitoring and/or mitigation measures may need to be established to protect important fisheries recourses at the time of the APD submittal. A field examination may also be required to determine the presence of any fish species where application has been made for site-specific oil/ gas development activity. Best management practices along with specific restrictions would be implemented to minimize negative impacts to fisheries.

3.2.18 Wildlife

Existing Conditions

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). Of special interest to many are the big and small game species as well as native species of special concern to conservation efforts in northeastern Nevada.

Predominant vegetation types of the approximately 400,000 acres nominated for the December sale is shown in 3.2.18 Table 1. Parcels located within the Elko resource area fall predominantly in intact sage brush communities, while parcels in the Spruce Mountain area are a mixture of intact sage, Wyomingensis and pinion/juniper. Intact sage habitats are the highest susceptible habitats to wildland fires. Though fires did not affect any parcels in 2005, approximately 200,000 acres of intact sage brush habitat burned. Grazing occurs within all parcels and recreational activities are high on parcels within the Beaver Creek Allotment (#s 533 to 540, 597 to 615) and Spruce Mountain (#s 749 to 778). All Elko parcels are in areas of high to moderate mining potential and parcel #s 543, 586 to 593, 596, 650 to 655, and 702 to715 are near to possible urban expansion (approximately 5100 acres). Deer, elk and bat populations are already being affected in the vicinity of the Spruce Mountain parcels due to grazing and high recreational use. The Beaver Creek area is undergoing intense riparian rehabilitation efforts in the form of prescribed burns, grazing restrictions and grazing management changes. Parcel # 727 is with the Mary's River Riparian pasture, which has been restricted to grazing since 1991.

3.2.18 - Table 1. Vegetation Types of December 2005 Sale Parcels

Vegetation Type	Approximate Acres	Approximate %
Aspen/Riparian	700	0.18
Bitterbrush	1,500	0.38
Greasewood	1,200	0.3
Pinyon and/or Juniper	19,500	4.9
Rabbit Brush	600	0.15
Cheatgrass	1,700	0.43
Salt Scrub/Brush	6,100	1.5
Shadscale	3,000	0.75
Perennial Grasslands	12,900	3.2
Mountain Shrub	7,000	1.8
Intact Sage	**300,500**	**75**
Black Sage	25,000	6.3
Low Sage	97,000	24.3
Great Basin Big Sage	36,000	9
Mountain Big Sage	62,000	15.5
Wyoming Big Sage	43,000	10.75
Low Sage/ Mountain Big Sage	9,000	2.25
Low Sage/ Wyoming Big Sage	4,000	1
Wyoming Big/Great Basin Big Sage	24,500	6.1

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 (Map 1). These habitats support approximately 37,900 mule deer throughout the year (Nevada Department of Wildlife, Big Game Status 2003-2004). This shows a declining trend in mule deer numbers from the 1998 trend count of approximately 54,332 animals and the 2000 trend count of 56,543 animals (Nevada Department of Wildlife, Big Game Status 1997-1998, 1999-2000). The current estimated forage demand for mule deer is 90,962 AUM's.

Pronghorn antelope also 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 (Map 2). These habitats provide for an estimated 4,295 antelope (Nevada Department of Wildlife, Big Game Statue 2003-2004). This shows an increasing trend in pronghorn antelope numbers from the 1998 trend count of approximately 2,783 animals and the 2000 trend count of 3,528 animals (Nevada Department of Wildlife, Big Game Statue 1997-1998, 1999-2000). The current estimated forage demand for antelope is 10,308 AUM's.

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. These issues are being addressed through the allotment evaluation and multiple use decision process to meet rangeland health standards. Antelope habitat condition has also declined due to fires on winter ranges and competition with domestic livestock for preferred forbs and grasses.

Table 2-1 identifies numerous parcels which contain *crucial mule deer seasonal ranges* and in *crucial pronghorn antelope seasonal ranges* that are subject to seasonal protection from disturbance. Maps 4 and 5 in this chapter show the location of the deer ranges within the oil & gas high and intermediate potential areas, and Maps 8 and 9 show pronghorn antelope ranges.

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 (Map 3). These habitats provide for an estimated 400 sheep (approximately 150 California and 250 Rocky Mountain) (Nevada Department of Wildlife, Big Game Status 2003-2004).

Rocky Mountain Elk currently reside on approximately 3,934,868 acres within the Elko District, mostly on the old Wells Resource side. This area is expanding each year as herd numbers

increase within the Elko District. There were approximately 2,009 animals recorded in 2004 (Nevada Department of Wildlife, Big Game Statue 2003-2004), with sizable herds in the parcel heavy Beaver Creek and Spruce Mountain areas. This number shows a recent increase in herd sizes in the Elko Resource Area (West Elko Elk Plan, 2002). As yet seasonal use areas are unknown.

Most lands in the Elko district may have raptor nesting sites and foraging areas. Leasing activities are subject to stipulations to provide seasonal protection from disturbance that are typically applied to a 0.5 mile radius around known nest sites. Nineteen *raptor species* are present in the Elko District. Of the nineteen, 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 may have unconfirmed nesting sites as young of the year have been observed. The Red-shouldered Hawk, Merlin, Gyrfalcon, and the Flammulated Owl are known to forage in the Elko District as of December 2004 (BLM Raptor Listing, 2005). Those species considered aa sensitive by BLM, along with other migratory birds of special concern, are discussed further in the sections on Migratory Birds (3.2.19) and Special Status Species (3.2.20).

Fifteen bat species have been documented in the Elko District, some of which are Special Status Species. These fifteen are: the 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).

Effects

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

Initial leasing of oil & gas parcels will not have a direct effect on wildlife resources, but initial surface disturbing activities of oil/ gas exploration and facility construction of lease parcels have a probability of occurring within the vicinity of resident wildlife populations and specific wildlife habitats. Small nongame mammals are distributed throughout the resource area. They are most affected by loss of food and cover, although blading for drill pads and construction of roads kills some outright. These losses to regional populations caused by oil/ gas activity are deemed insignificant.

Mule deer and antelope crucial habitats exist in much of the oil/ gas high and intermediate potential areas (Map 4-5, 8-9) and mule deer migration routs run through these areas as well

(Map 6, 7). Elk habitat is also within the oil/ gas intermediate 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 or weed invasion. Of all the big game animals in the resource area, elk are the most sensitive to and intolerant of human presence and man-made disturbance. Oil/ gas activity in their preferred habitat would tend to displace them to other areas: since habitat suitable for elk is limited, displacement may mean death for some of the animals. Since seasonal use areas are still unknown, further restrictions at future dates may be necessary at APD submittal.

Environmental effects of oil/ gas resource development are similar to other activities affecting terrestrial habitat, and surface and groundwater. While each species would respond differently to various impacts, all of them could be affected by activities that alter the thermal, physical, or chemical characteristics of their habitats.

Physical habitat alteration could result from on-site facility construction, road and power line construction. Impacts include permanent individual or population displacement from preferred to marginal habitat and potential for animal mortality or behavioral changes in the vicinity of the facility site due to either interaction with construction activity or by being unable to adapt to new habitat conditions. Though some individual animals will become accustomed to the workings of a facility and return to utilize habitat within close proximity to it, most will be permanently displaced either due to mortality or behavioral changes. Mortality can also take place 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 construction site due to fencing, noise and high activity levels. Raptors may be particularly affected since nesting season is generally the time of highest physiological stress. Disturbance, even a one-time occurrence, may cause the more sensitive species (ferruginous hawk, Swainson's hawk and the short-eared owl) to abandon their nests.

Raptor electrocution on power lines associated with drill fields could occur, but should not be a critical problem. Existing SOPs for power lines include apparatus to discourage perching and power lines are a common occurrence throughout the resource area to which raptors have become accustomed.

Impacts of groundwater removal could affect spring and stream discharge (which could modify physical, chemical, and thermal characteristics of aquatic habitats), and alter the thermal characteristics of soils. Surface discharge of thermal waters could also affect chemical and thermal characteristics of habitats that are important to terrestrial and aquatic communities. In addition, oil/ gas and geothermal development at various stages could disrupt big game movement corridors.

Avian species would be most affected by post-leasing activities, including power line construction and operation, and maintenance of high-tension power lines, access roads, and towers. Habitat alteration and fragmentation and modification of thermal and chemical characteristics of surface waters could directly affect riparian vegetation that is used for nesting

and foraging. Mortality from electrocution could occur when power lines are used for roosting. Oil/gas development could adversely impact breeding, nesting, and brood-rearing habitat for sage grouse by removal of vegetation and destruction of areas during construction. Indirect effects are largely attributed to increased human activity, which could displace individuals or reduce nesting success of species that are sensitive to disturbance. Road construction could also increase access into areas that are currently remote and provide for additional legal and illegal take. Species associated with larger aquatic habitats (e.g., aquatic, marshland, and riparian species) could be adversely affected by increased activity in riparian systems (e.g., road construction, disturbances that increase erosion, etc.) and by changes in water quality that could be associated with surface release of geothermal water or construction materials. Spring-dwelling species could also be affected by these factors in addition to alterations in discharge and thermal characteristics that could occur with groundwater removal. Some small and immobile species could suffer direct mortality due to construction activities. Exploration, construction and operation impacts to resident wildlife populations will be evaluated at the time of the APD submittal and where appropriate stipulations, SOP's and monitoring measures will be applied.

Initial reclamation activities will continue to keep wildlife from utilizing the site area until completion. There are benefits for wildlife which result from oil and gas activity, but they do not outweigh the adverse impacts. After all activity ceases, individuals and populations will likely return to the area, possibly in even greater numbers, depending on the success of reclamation. Reclamation of abandoned drill pads and roads with grass species in vegetative communities where sagebrush occurs in dense stands creates openings and increases the amount of edge between habitat types. Increasing the amount of edge increases the number of individuals and diversity of wildlife in the area. There is also the potential, though, for permanent habitat loss to occur if reclamation is not successful and weed invasion occurs. Reclamation measures and monitoring are established at the time of the APD submittal.

Seasonal restrictions from disturbance in crucial mule deer winter ranges apply during the period 11/15-3/16, inclusive. Determining wintering seasonal buffer zones for mule deer on a site-specific basis would increase the protection BLM can afford these animals. Winter range is limited and dates reflect when large numbers of animals reside on these small areas. Displacement from these areas on these dates due to land use disturbance is detrimental (Elko RMP (pg. 2-4), ROD, Wilkinson 2005 (personnel correspondence), Field Guide to Mammals (1976)).

Seasonal restrictions from disturbance in crucial antelope yearlong ranges (including winter) apply during the period 11/15-3/16, inclusive. Determining wintering season buffer zones for pronghorn antelope on a site-specific basis would increase the protection BLM can afford these animals. Winter range is limited and dates reflect when large numbers of animals reside on these small areas. Displacement from these areas on these dates due to land use disturbance is detrimental. (Elko RMP (pg. 2-6), ROD, Wilkinson 2005 (personnel correspondence), Field Guide to Mammals 1976).

Most lands in the Elko district may have raptor nesting sites and foraging areas and so are subject to seasonal protection from disturbance that are typically applied to a 0.5 mile radius around known nest sites. As indicated in Appendix B, inclusive dates of the seasonal restrictions from disturbance around the nesting sites vary depending on the species as follows:

a) Golden Eagles and Great Horned Owls -- 1/1-6/30
b) Long-eared Owl -- 2/1-5/15
c) Prairie Falcon -- 3/1-6/30
d) Ferruginous Hawk, Northern Harrier and Barn Owl -- 3/1-7/31
e) Goshawk Hawk and Sharp-shinned Hawk 3/15-7/15
f) Cooper's Hawks, Kestrels, and Burrowing Owls -- 4/1-6/30
g) Red-tailed Hawk and Swainson's Hawk -- 4/1-7/15
h) Short-eared Owl -- 2/1-6/15

Surveying areas to be disturbed and determining seasonal buffer zones for active raptor nests on a site-specific basis increases the protection BLM can afford raptors. An arbitrarily determined buffer zone, such as the ½ mile radius specified for each species above, may 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 may be larger than necessary to prevent disturbance of a nesting raptor.

Positive cumulative impacts are expected to result from the Great Basin Restorative Initiative and on going stream/riparian and upland restoration and implementation of multiple use decisions to meet rangeland health standards. Land uses that can 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 may be present at the proposed development site and/or may occur seasonally.

If all of the 1,200 acres to be disturbed by oil/gas activity over the course of the next 15 years were to occur within the high probability area, this would only constitute 0.5 % of the total acreage. The cumulative impacts of lease development of this 0.5 % 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. If the development of a large number of leases were to occur in the same geographical area or if development occurred within as intense grazing and or mining region, disturbance could be significant. 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 APD.

To minimize the effects on fisheries, wildlife, migratory birds and special status species, the lessee would be required to complete a site-specific NEPA analysis outlining their proposed action and alternatives, and the direct, indirect and cumulative impacts of their proposed action on any species prior to any occupancy and surface disturbance. Area impacts would then need to be evaluated for specific mitigations that could be implemented as a condition of APD approval.

Mitigation

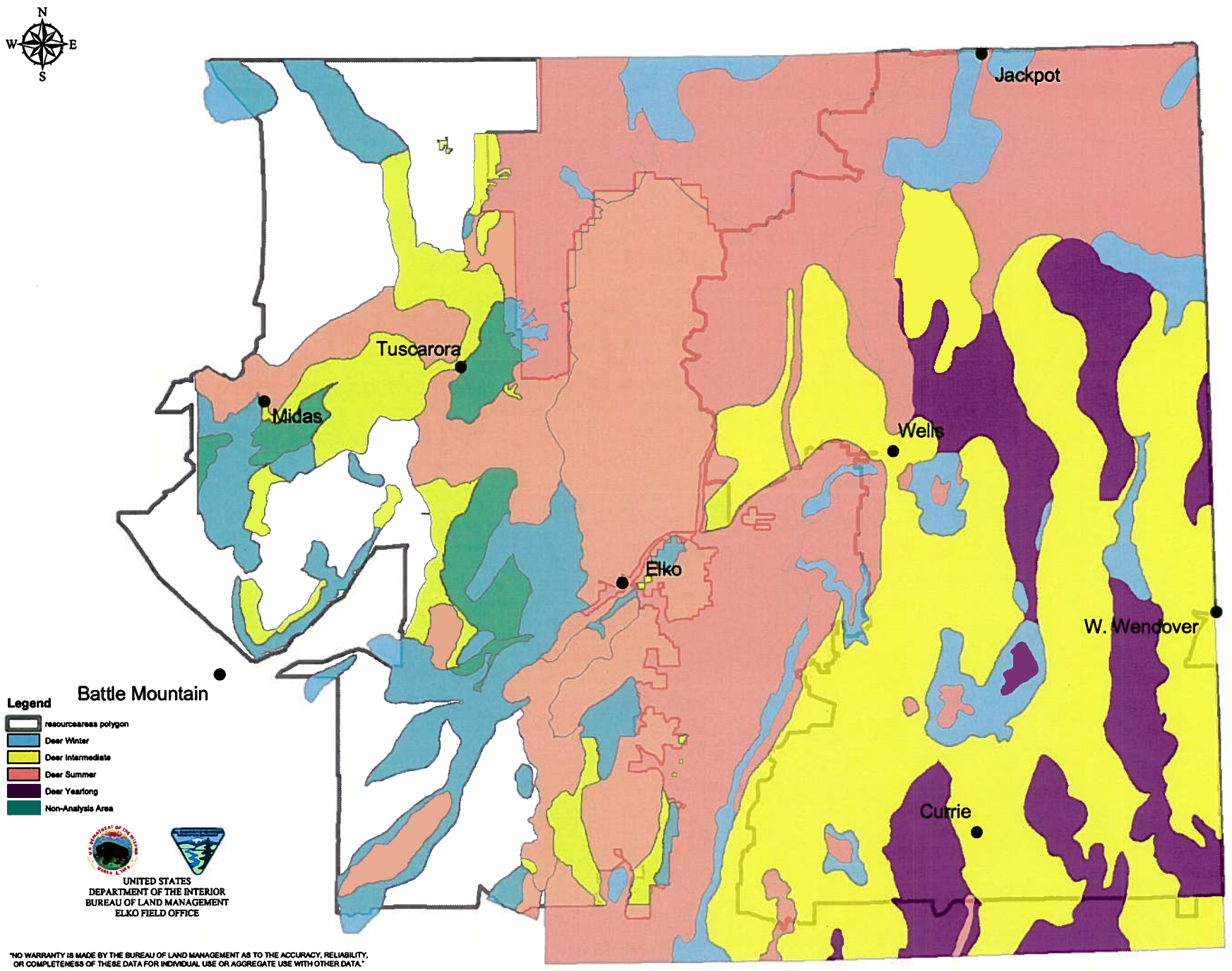
Additional monitoring and/or mitigation measures may need to be established to protect important wildlife resources at the time an exploration or development proposal is submitted for BLM approval on leased lands. A field examination may also be required to determine the presence of any wildlife species of concern at this time.

Additional protective measures and/or operating limitations would be established for mule deer fawning season (5/15-7/15), antelope fawning season (5/1-6/30), bighorn sheep lambing season (4/1-6/15), Rocky Mountain elk rutting and calving seasons (8/15-10/1, 5/15-7/1). Determining lambing season and calving and rutting season buffer zones for bighorn sheep and elk on a site-specific basis would increase the protection BLM can afford these animals (Elko RMP, ROD, Field Guide to Mammals (1976), Mammals (2001)). Extensive areas in the Elko district have been identified as bighorn sheep and/or elk range and are subject to seasonal protection from disturbance.

As APD's are being reviewed, appropriate buffer zones and seasonal restrictions from disturbance should be specified. (Wells RMP, ROD, Birds of the Great Basin, 1985, State Director Decision: Horse Canyon Decision, 2005). Specifications for the construction of any power lines would also be determined to to include apparatus that discourages raptor perching. Best management practices along with specific restrictions would be implemented to minimize negative impacts to wildlife habitat.

Oil & Gas EA
Mule Deer Range in the Elko District

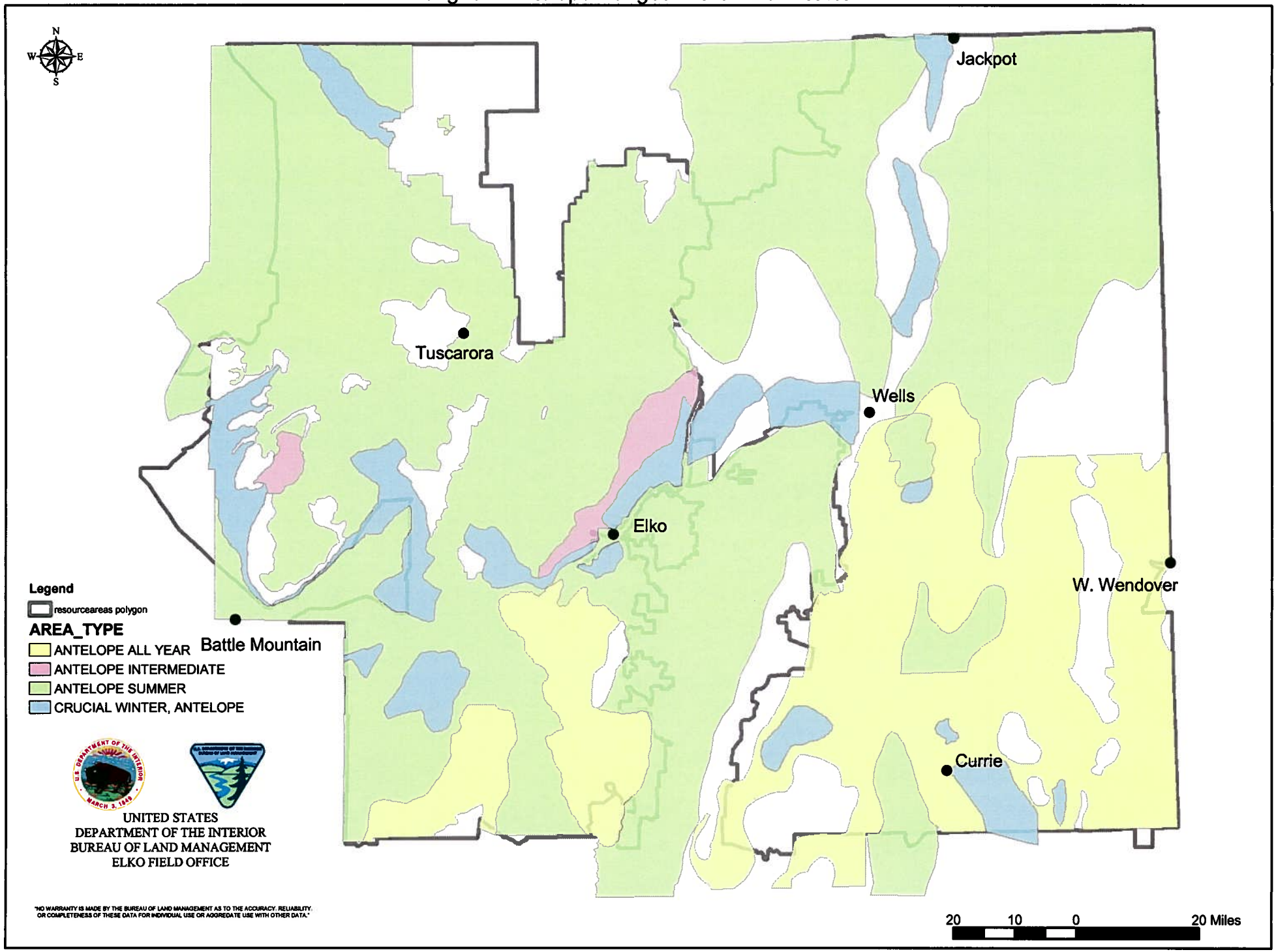
3.2.18 Map 1



Oil & Gas EA

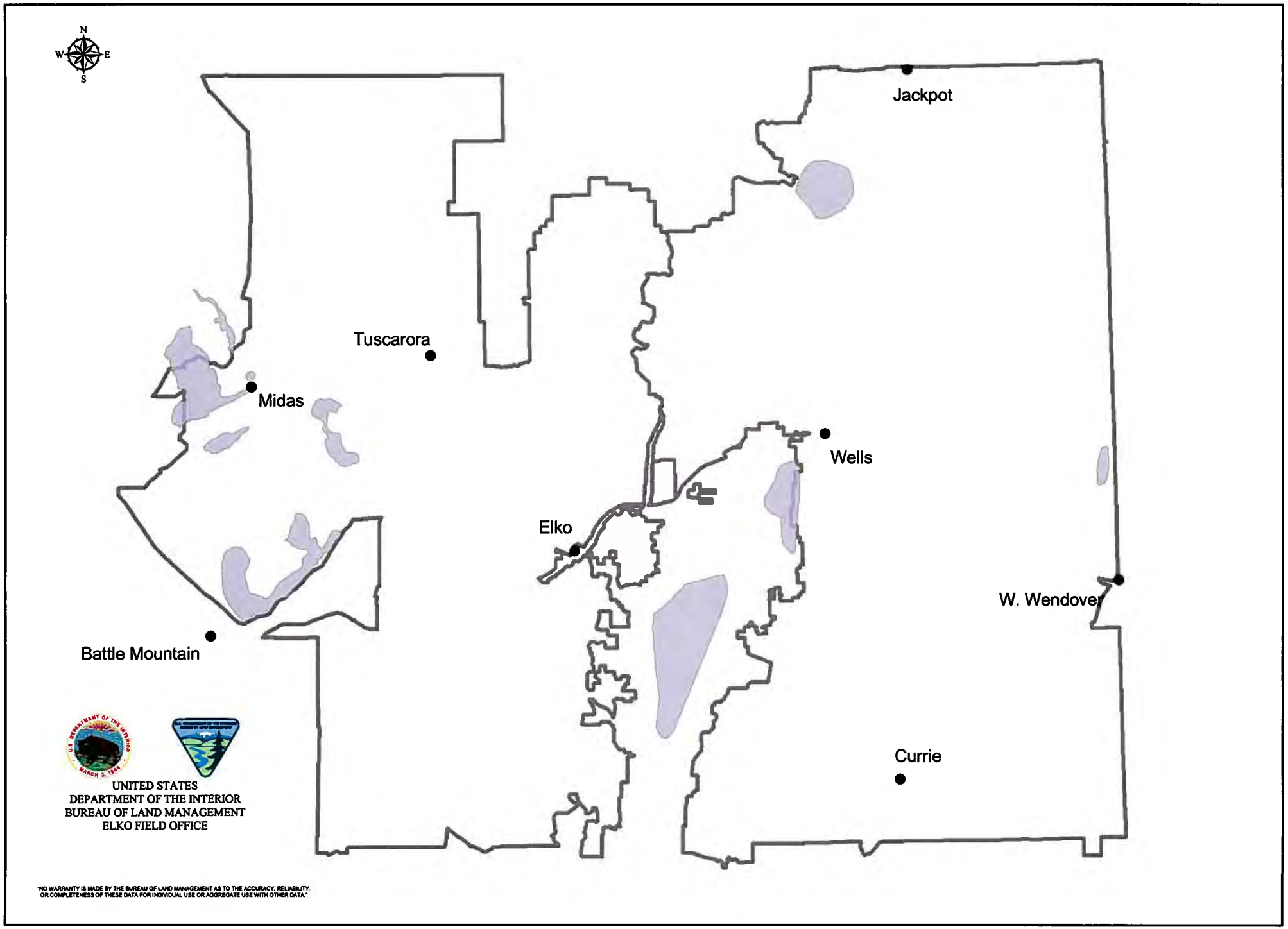
3.2.18 Map 2

Pronghorn Antelope Ranges in the Elko District



Oil & Gas EA
Bighorn Sheep Range in the Elko District

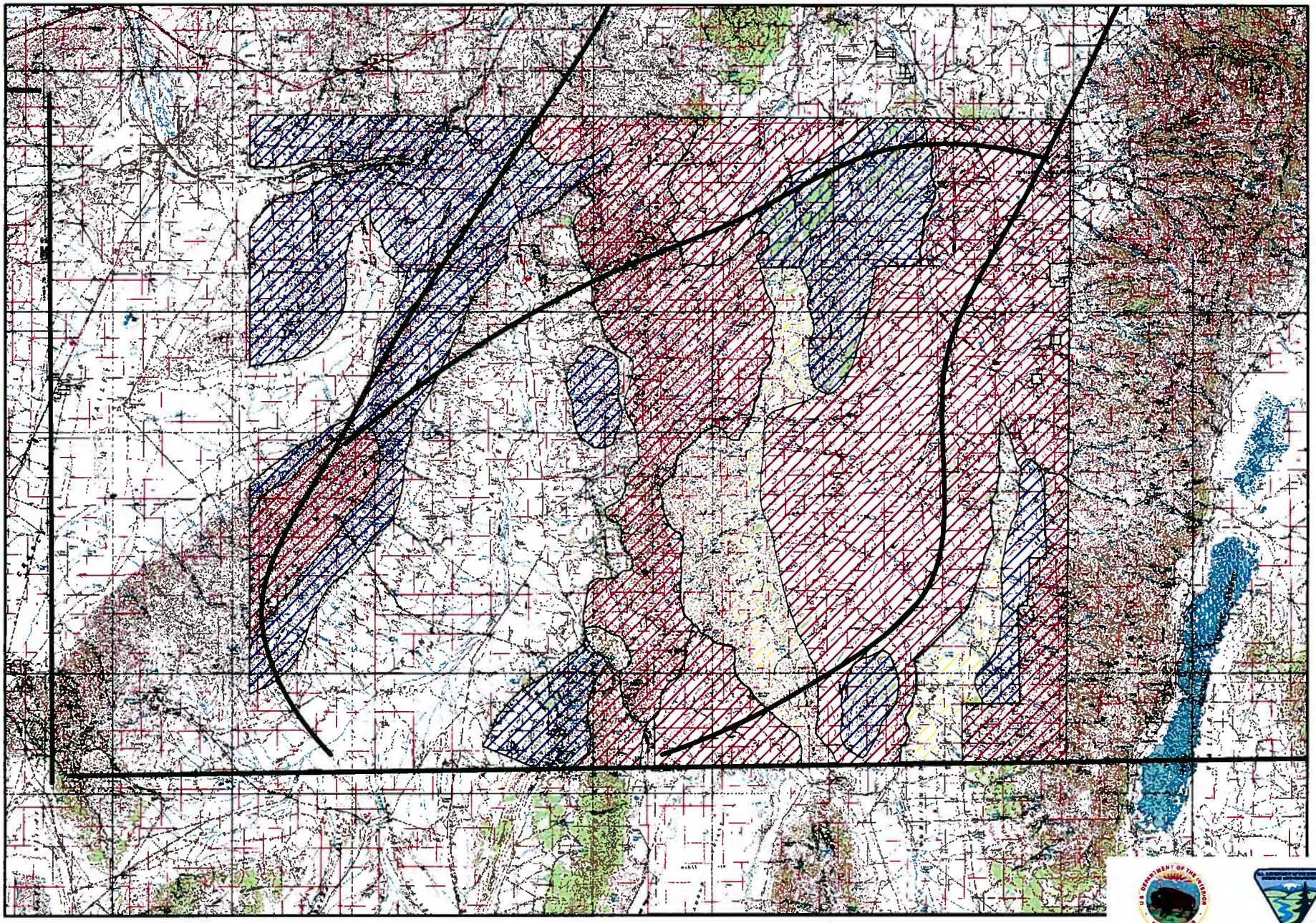
3.2.18 Map 3



Oil & Gas EA

Deer Habitat in High Potential Area

3.2.18 Map 4



Deer Intermediate
Deer Summer
Deer Crucial Winter

0 1.25 2.5 5 7.5 10 Miles

Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

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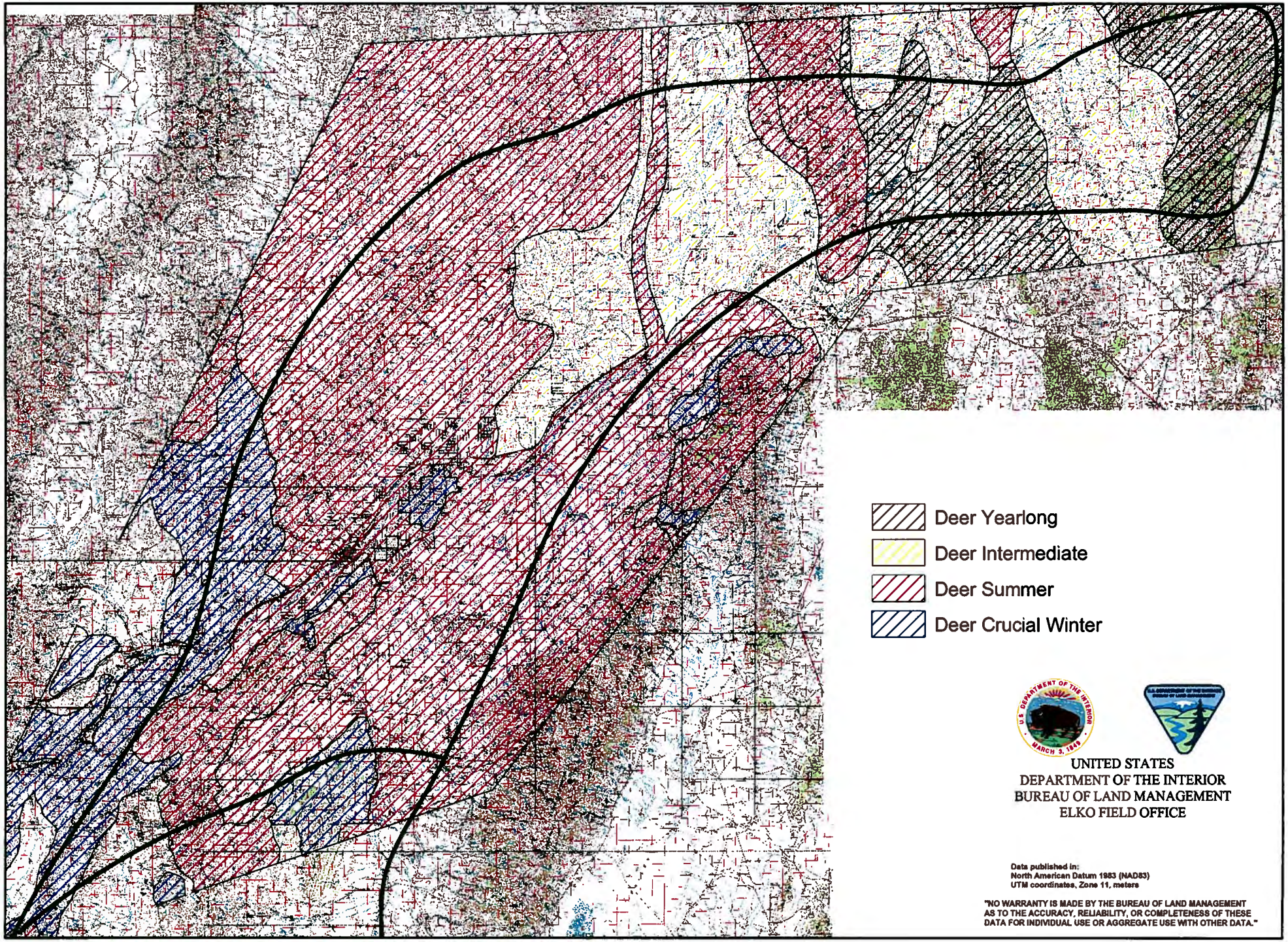
Oil & Gas EA
Deer Habitat In Intermediate Potential Area

3.2.18 Map 5



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Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

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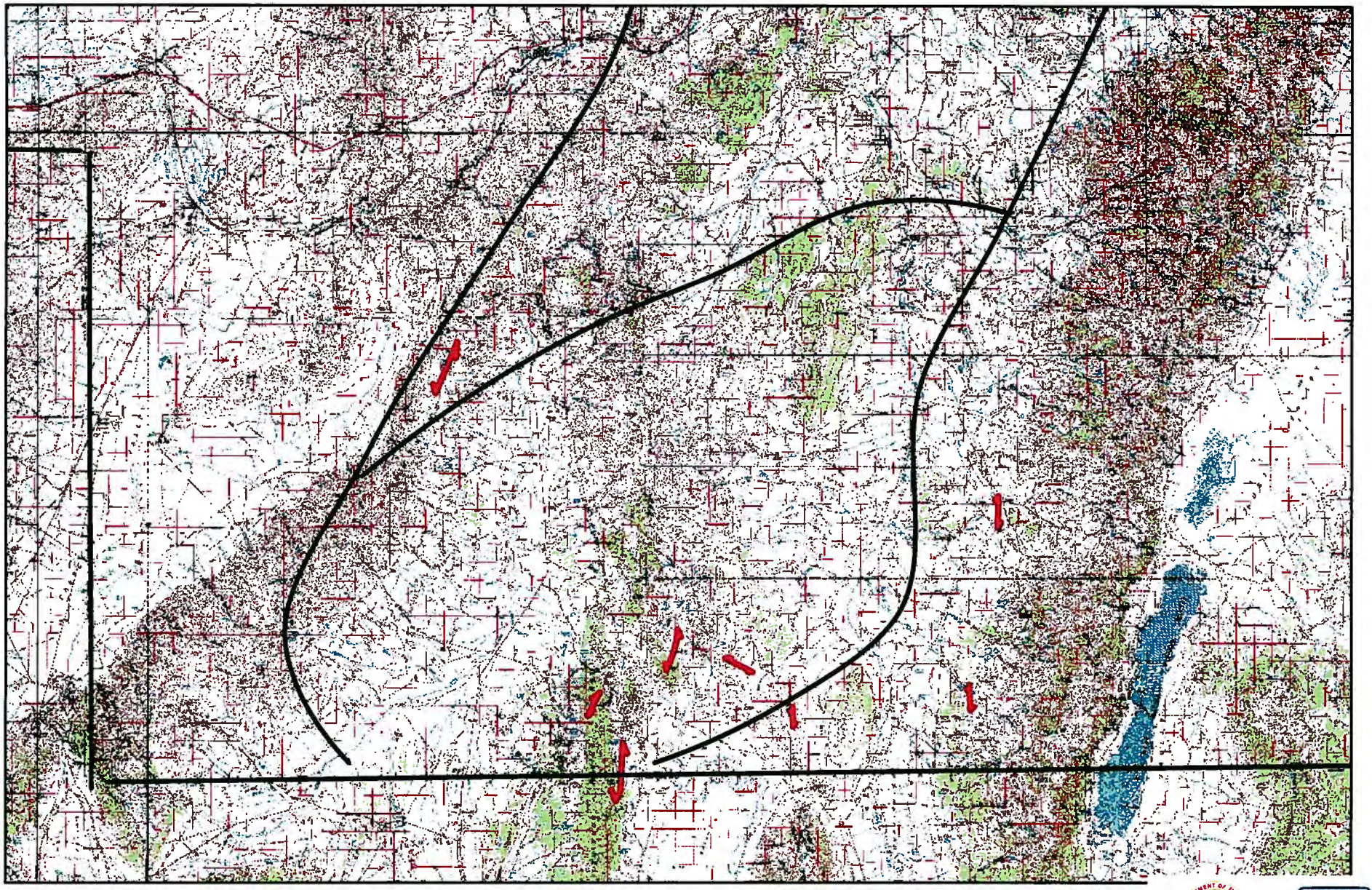
N

Oil & Gas EA

Mule Deer Migration Routes in High Potential Area

3.2.18 Map 6



0 1.5 3 6 9 12 Miles

Legend

deer migration routes

Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

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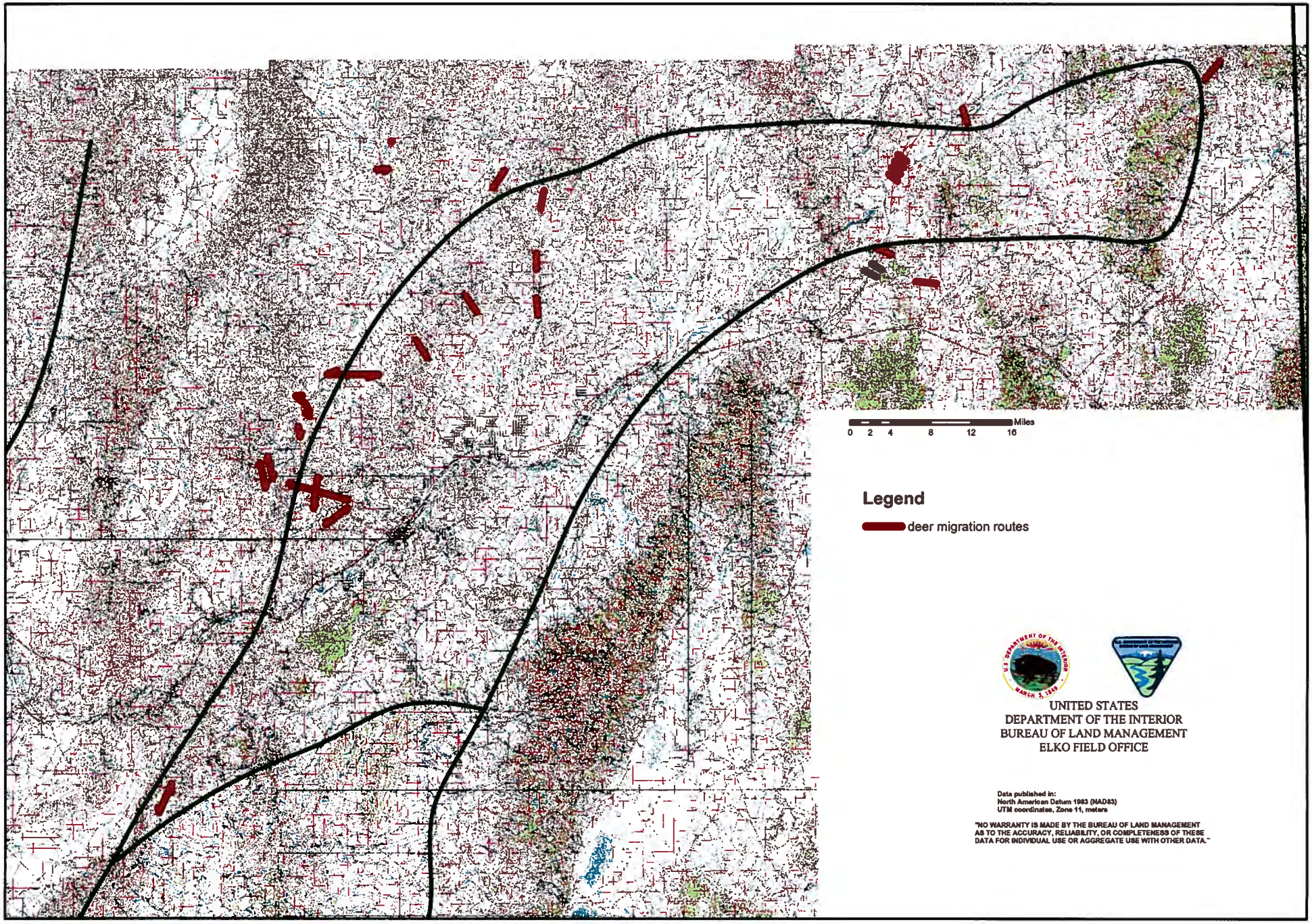
Oil & Gas EA

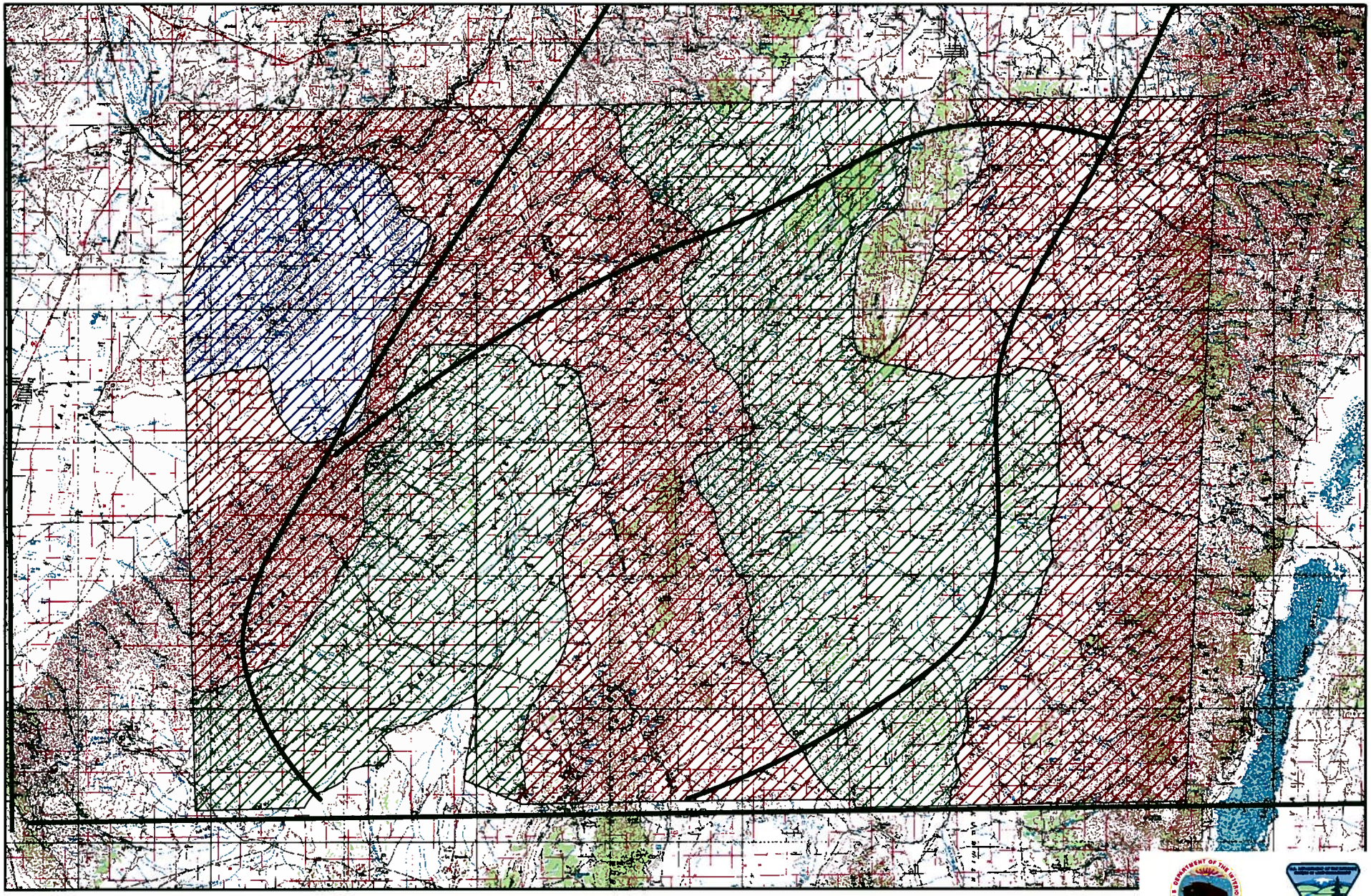
Mule Deer Migration Routes In Intermediate Potential Area

3.2.18 Map 7



Oil & Gas EA
Antelope Habitat in High Potential Area

3.2.18 Map 8



Legend

- Antelope Summer
- Antelope Winter
- Antelope Yearlong

0 1.5 3 6 9 12 Miles

Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

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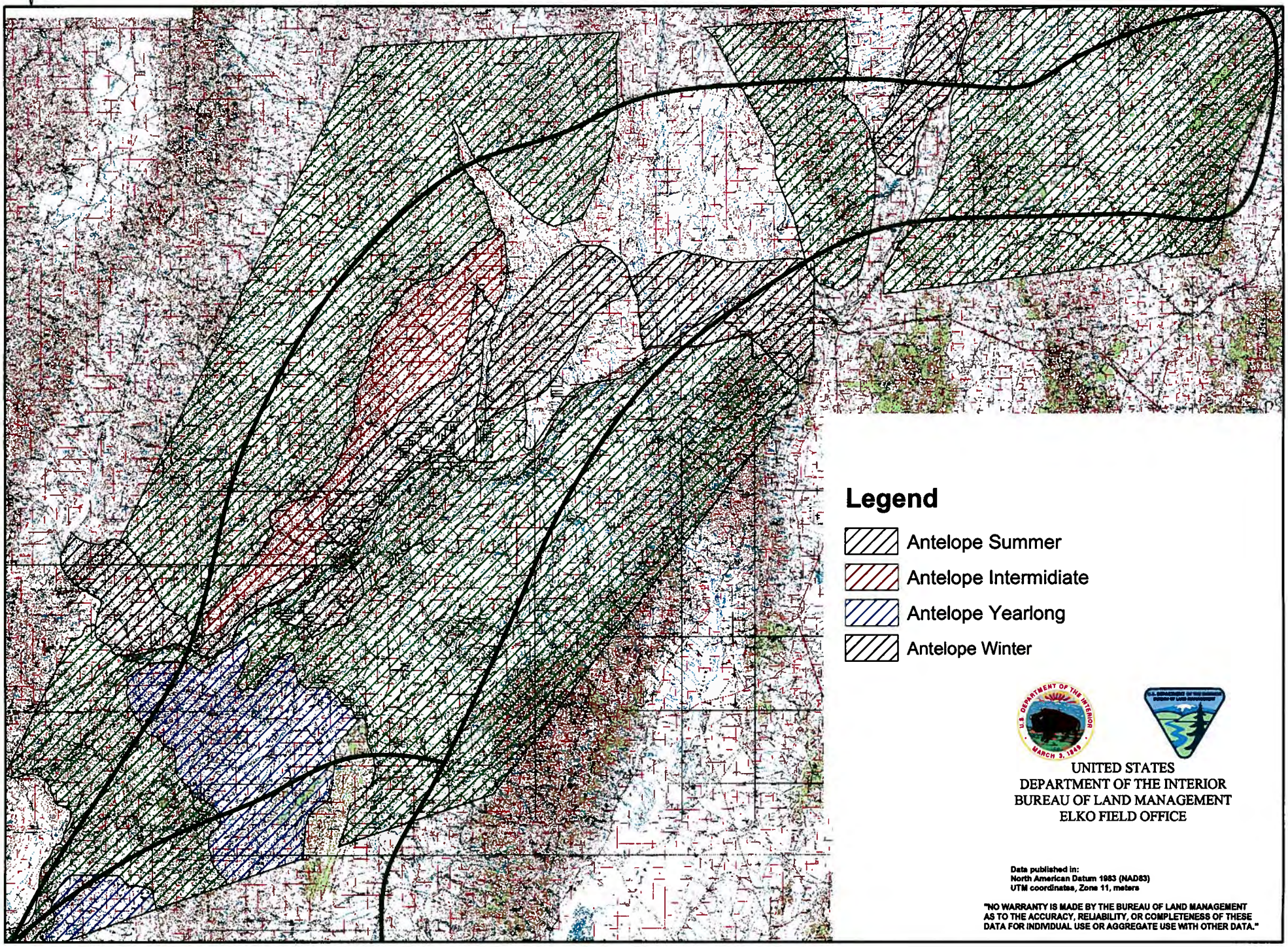
Oil & Gas EA
Antelope Habitat in Intermediate Potential Area

3.2.18 Map 9



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Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

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3.2.19 Migratory Birds

Existing Conditions

According to the BLM Elko Field Office "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. Relative to this order, the species shown in Table 2 are "priority" migratory bird species that may occur in the habitat types on BLM administered lands. This listing is from the 1999 Nevada Partners in Flight Bird Conservation Plan.

Table 2. Nevada Partners in Flight Bird Conservation Plan Elko District Ecotypes

Agricultural Lands	Aspen	Cliffs/ Talus	Coniferous Forest	Lowland Riparian	Montane Riparian
Bobolink	Northern Goshawk	Prairie Falcon	Northern Goshawk	Southwestern Willow Flycatcher	Wilson's Warbler
Swainson's Hawk	Orange-crowned Warbler	Black Rosy Finch	Flammulated Owl	Western Yellow-billed Cuckoo	MacGillivray's Warbler
Greater Sandhill Crane	Flammulated Owl	Ferruginous Hawk	Three-toed Woodpecker	Ash-throated Flycatcher	Willow Flycatcher
Long-billed Curlew	Lewis' Woodpecker		White-headed Woodpecker	Bank Swallow	Cooper's Hawk
White-faced Ibis	Calliope Hummingbird		Olive-sided Flycatcher	Blue Grosbeak	Calliope Hummingbird
Ferruginous Hawk	Red-naped Sapsucker		Western Bluebird	Virginia's Warbler	Lewis' Woodpecker
Prairie Falcon	MacGillivray's Warbler		Grace's Warbler	Yellow-breasted Chat	

Montane Shrub	Mountain Mahogany	Pinyon/ Juniper	Sagebrush	Salt Desert Scrub	Wetlands & Lakes
Short-eared Owl	Wilson's Warbler	Pinyon Jay	Cooper's Hawk	Lewis' Woodpecker	Red-naped Sapsucker
Burrowing Owl	Black-throated Gray Warbler	Gray Vireo	Lewis' Woodpecker	Phainopepla	Orange-crowned Warbler
Black Rosy Finch	Virginia's Warbler	Juniper Titmouse	Red-naped Sapsucker	Western Bluebird	Yellow-breasted Chat
Calliope Hummingbird	Cooper's Hawk	Black-throated Gray Warbler	Sage Grouse	Lucy's Warbler	White-faced Ibis
Loggerhead Shrike	Northern Goshawk	Ferruginous Hawk	Ferruginous Hawk	Loggerhead Shrike	Snowy Plover
Swainson's Hawk	Flammulated Owl	Gray Flycatcher	Sage Sparrow	Burrowing Owl	American Avocet
	Gray Flycatcher	Western Bluebird	Sage Thrasher		Black Tern
	Juniper Titmouse	Virginia's Warbler	Vesper Sparrow		American White Pelican
	Red-naped Sapsucker	Scott's Oriole	Gray Flycatcher		Clark's Grebe
			Burrowing Owl		Long-billed
			Loggerhead Shrike		

			Black Rosy Finch Calliope Hummingbird Prairie Falcon Swainson's Hawk		Curlew Short-eared Owl Greater Sandhill Crane

Effects

Initial leasing of oil and gas parcels will not have a direct effect on migratory birds, but initial surface disturbing activities of oil/ gas and 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 can 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 will become accustomed to the workings of the facility and return to utilize habitat within close proximity to it, most will be permanently displaced either due to mortality or behavioral changes.

Initial reclamation activities will continue to keep many birds from utilizing the site area until completion. After all activity ceases, individuals birds and populations will likely return to the area. It is possibly that migratory bird numbers could increase, if successful reclamation expands the diversity of habitat types. For more information on potential impacts to migratory birds, refer to the wildlife effects section of the text.

Mitigation

Ground disturbing activities during the nesting season (March to July) should be avoided to conserve migratory birds. Surveys 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 could include avoidance, construction constraints and/or establish buffers (Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds). Best management practices along with specific restrictions would be implemented to minimize negative impacts to migratory birds.

3.2.20 Special Status Species

Existing Conditions

A number of Federal and State special status species occur throughout northern Nevada. Any action that could affect a Federally-listed threatened or endangered species is subject to consultation with the USFWS pursuant to Section 7 of the Endangered Species Act (ESA) of 1973. For special status species (e.g., candidate, and/or species of concern), BLM policy (6840.02 B) is to not authorize actions that could adversely affect their populations and thus contribute to listing any of these species under provisions of the ESA. BLM also signed a Memorandum of Understanding with the U.S. Geological Survey, U.S. Department of Agriculture Forest Service, Smithsonian Institution, U.S. National Park Service, USFWS, and The Nature Conservancy on November 6, 1998, to conserve springsnail species throughout the Great Basin. Federally threatened, endangered, candidate, and species of concern may occur in a variety of habitat types throughout the district.

As per the July 29, 2003 BLM Elko Field Office Threatened, Endangered, Candidate and BLM Sensitive species list, there are approximately 21 birds. 1 amphibian, 11 fish, 16 invertebrates, 21 mammals and 42 plant species that occur in the Elko district on a seasonal or yearlong basis. Of these, approximately 16 bird species, 1 amphibian species, 6 fish species, 11 invertebrate species, 18 mammalian species, and 22 plant species have the greatest potential to be impacted by the proposed action due to their occurrence within the oil and gas/geothermal high and intermediate probability areas. These species and their special status are:

Birds

Mountain plover (sensitive)	*Charadrius montanus*
American peregrine falcon (endangered)	*Falco peregrinus anatum*
Bald eagle (threatened)	*Haliaeetus leucocephalus*
Northern goshawk (sensitive)	*Accipiter gentilis*
Western burrowing owl (sensitive)	*Athene cunicularia hypugea*
Ferruginous hawk (sensitive)	*Buteo regalis*
Sage grouse (sensitive)	*Centrocercus urophasianus*
Least bittern (sensitive)	*Ixobrychus exilis hesperis*
White-faced ibis (sensitive)	*Plegadis chihi*
Columbia sharp-tailed grouse (sensitive)	*Tympanuchus phasianellus columbianus*
Mountain quail (sensitive)	*Oreortyx pictus*
Osprey (sensitive)	*Pandion haliaetus*
Flammulated owl (sensitive)	*Otus flammeolus*
Wood stork (sensitive)	*Mycteria americana*
Sandhill crane (sensitive)	*Grus canadensis*
Yellow billed cuckoo (candidate)	*Coccyzus americanus occidentalis*

Amphibian

Spotted frog (candidate)	*Rana luteiventris*

Fishes

Lahontan cutthroat trout (threatened)	*Oncorhynchus clarki henshawi*
Independence Valley tui chub (endangered)	*Gila bicolor isolata*
Leatherside chub (sensitive)	*Gila copei*
Interior redband trout (sensitive)	*Oncorhynchus mykiss gibbsi*
Relict dace (sensitive)	*Relictus solitarius*
Independence Valley speckled dace (endangered)	*Rhinichthys osculus lethoporus*

Invertebrates

Mattoni's blue butterfly (sensitive)	*Euphilotes rita mattoni*
Nevada viceroy (sensitive)	*Limenitus archippus lahontani*
Grey's silverspot butterfly (sensitive)	*Speyeria atlantis greyi*
California floater (sensitive)	*Anodonta californiensis*
Cortez Hills pebblesnail (sensitive)	*Pyrgulopsis bryantwalkeri*
Crittenden Springsnail (sensitive)	*Pyrgulopsis lentiglans*
Elko springsnail (sensitive)	*Pyrgulopsis leporina*
Twentyone Mile springsnail (sensitive)	*Pyrgulopsis millenaria*
Upper Thousand Spring springsnail (sensitive)	*Pyrgulopsis hovinghi*
Humboldt springsnail (sensitive)	*Pyrgulopsis humboldtensis*
Nevada water mite (sensitive)	*Thermacarus nevadensis*

Mammals

Pygmy rabbit (sensitive)	*Brachylagus idahoensis*
Townsend's big-eared bat (sensitive)	*Corynorhinus townsendii townsendii*
Spotted bat (sensitive)	*Euderma maculatum*
Brazilian free-tailed bat (sensitive)	*Tadarida brasiliensis*
Hoary bat (sensitive)	*Lasiurus cinereus*
Pallid bat (sensitive)	*Antrozous pallidus*
Silver-haired bat (sensitive)	*Lasionycteris noctivagans*
Western red bat (sensitive)	*Lasiurus blossevillii*
Big brown bat (sensitive)	*Eptesicus fuscus*
Little brown myotis (sensitive)	*Myotis lucifugus*
Small-footed myotis (sensitive)	*Myotis ciliolabrum*
Long-eared myotis (sensitive)	*Myotis evotis*
Fringed myotis (sensitive)	*Myotis thysanodes*
Long-legged myotis (sensitive)	*Myotis volans*
Yuma myotis (sensitive)	*Myotis yumanensis*
Occult myotis (sensitive)	*Myotis lucifugus occultus*
Western pipistrelle (sensitive)	*Pipistrellus hesperus*
Preble's shrew (sensitive)	*Sorex preblei*

Plants

Meadow pussytoes (sensitive)	*Antennaria arcuata*
Grouse Creek rockcress (sensitive)	*Arabis falcatoria*

Elko rockcress (sensitive)	*Arabis falcifructa*
Goose Creek milkvetch (sensitive)	*Astragalus anserinus*
Robbins milkvetch (sensitive)	*Astragalus robbinsii* var. *occidentalis*
Broad fleabane (sensitive)	*Erigeron latus*
Lewis buckwheat (sensitive)	*Eriogonum lewisii*
Grimy ivesia (sensitive)	*Ivesia rhypara* var. *rhypara*
Grimes vetchling (sensitive)	*Lathyrus grimesii*
Bruneau River prickly phlox (sensitive)	*Leptodactylon glabrum*
Packard's stickleaf (sensitive)	*Mentzelia packardiae*
Least phacelia (sensitive)	*Phacelia minutissima*
Cottam cinquefoil (sensitive)	*Potentilla cottamii*
Ruby Mountain primrose (sensitive)	*Primula capillaris*
Jan's catchfly (sensitive)	*Silene nachlingerae*
Leiberg clover (sensitive)	*Trifolium leibergii*
Rock violet (sensitive)	*Viola lithion*
Obscure buttercup (sensitive)	*Ranunculus triternatus*
Rayless tansy aster (sensitive)	*Machaeranthera grindelioides* var. *depressa*
Barren Valley collomia (sensitive)	*Collomia renacta*
Beatley buckwheat (sensitive)	*Eriogonum beatleyae*
Lamoille Canyon milkvetch (sensitive)	*Astragalus robbinsii* var. *occidentalis*

Special Status Species of High Interest in the Elko District

Bald eagles (federally listed threatened) 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 26 eagles in January 2004; this is down from a count of 42 taken in 2001, a reduction of 38% (The National Triennial Midwinter Bald Eagle Count and Wintering Birds of Prey Survey Report, NDOW, 2004).

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). Site maps of leks, summer, winter and nesting sage grouse habitat areas within the Elko District Oil & Gas high and intermediate potential areas are included in this chapter. There are approximately 900 strutting grounds or leks on BLM administered lands (3.2.20 Map 1). 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 (3.2.20 Map 2). Brood rearing habitats consist of upland sagebrush areas adjacent to riparian meadows (3.2.16 Map 1, 3.2.20 Map 2). 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 (3.2.20 Map 2). These habitats are usually more extensive in area than the other seasonal habitats

There are numerous parcels proposed for leasing that have been identified as sage grouse strutting grounds that are subject to surface and seasonal protection from disturbance (see Table 2-1 at the end of Chapter 2).

The *Columbia spotted frog*, (federally listed candidate) has been documented over a good portion of the Elko District (3.2.20 Map 3). 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. A deep silt or muck substrate may be required for hibernation and torpor. Females may lay only one egg mass per year; yearly fluctuations in the sizes of egg masses are extreme. 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).

Lahontan cutthroat trout (LCT) (federally listed threatened) occur in eight major sub basins: North Fork Humboldt River, South Fork Humboldt River, East Humboldt River, South Fork Little Humboldt River, Maggie Creek, Mary's River, Pine Creek, and Rock Creek (3.2.20 Map 4). 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 by the FWS, NDOW, and the Elko BLM.

Of the parcels nominated for the December 2005 sale, many contain LCT. These parcels are #s 380, 423-438, 460-469, 472-481, 499, 500, 506, 507, 525-542, 588, 589, 597-606, 609, 612, 614, 615, and 732.

The *Preble's shrew* 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 rabbits 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 may 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 may include rock crevices on steep cliff faces, springs, canyons, coniferous forests (including juniper), and

deciduous forests. Roosting can 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 action.

Effects

Initial leasing of oil/ gas parcels will not have a direct effect on special status species, but initial surface disturbing activities of oil/ gas exploration and facility construction of lease parcels have a probability of occurring within the vicinity of resident special status species populations. Oil and gas development could affect species of concern in a variety of indirect ways. Potential impacts are summarized below, but a site-specific NEPA analysis of how each species would be affected would be conducted as proposals for development of a lease are received.

Environmental impacts of oil and gas 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. The environmental impacts on special status species are expected to be restricted to small geographical areas during the life of an oil/ gas operation.

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. An inventory for special status species is required on leased parcels in known or potential habitat for threatened, endangered, or candidate species. Table 2-1 shows that all parcels are subject to a stipulation providing protection to special status species with specific stipulations attached to parcels known to have sage grouse leks, brood rearing areas, or crucial winter habitat. All actions will be submitted to FWS if BLM determines the action "may affect" a listed threatened or endangered species (Elko RMP, ROD).

The application of stipulations to leasing activities are expected to negate displacement of special status plant species, long-term changes to habitat quality and modifications 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 a negative impact on any special status species. The BLM will require modifications or reject any proposed action that is likely to jeopardize the continued existence of a species or result in the destruction or modification of its habitat. As such, it is unlikely that any special status plants will be adversely affected.

Impacts to special status animal species include temporary individual or population displacement from preferred to marginal habitat, 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 can 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 will become accustomed to the workings of the facility and return to utilize habitat within close proximity to it, most will 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. Sage grouse crucial habitats occur in the majority of the oil/ gas high and intermediate potential areas (Maps 5 through 12). Spotted frog (Maps 13, 14) and LCT (Maps 15, 16) habitat also occurs in these areas. Bald eagles inhabit the district and potentially oil/ gas high and intermediate areas and 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 may or may not be present in the same general area.

Mitigation

As noted above, inventories for special status species of vegetation and wildlife shall be conducted prior to site development. If sensitive species are located on sites proposed for development, it may be necessary to exclude disturbance, develop mitigation measures, and/or avoid the species. Those populations or occurrences, upon which analysis determines protection to be necessary, will be protected by: 1) relocation or rerouting of the proposed seismic line or travel routes, 2) applying best management practices, and 3) applying other protective mitigation measures as deemed necessary by the authorized officer (Elko RMP, ROD).

Current BLM stipulations for sage grouse and sagebrush ecosystems include ground disturbance restrictions of ½ mile radius around an active sage grouse lek and a 2 mile seasonal restriction during nesting/brooding periods. The ½ mile radius is considered to be an acceptable distance for minimal disturbances of a lek (BLM Horse Canyon State Director Decision, 2005), but 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.

Activity on leased 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 (Elko RMP, ROD; Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000; BLM Nevada State Director Horse Canyon Decision, 2005).

These additional 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 Field Office during the dates of 3/1-5/15 and/or 5/15-8/15, inclusive.

b) Avoid permanent occupancy of potential habitat where possible. Where not possible, consider off-site mitigation.

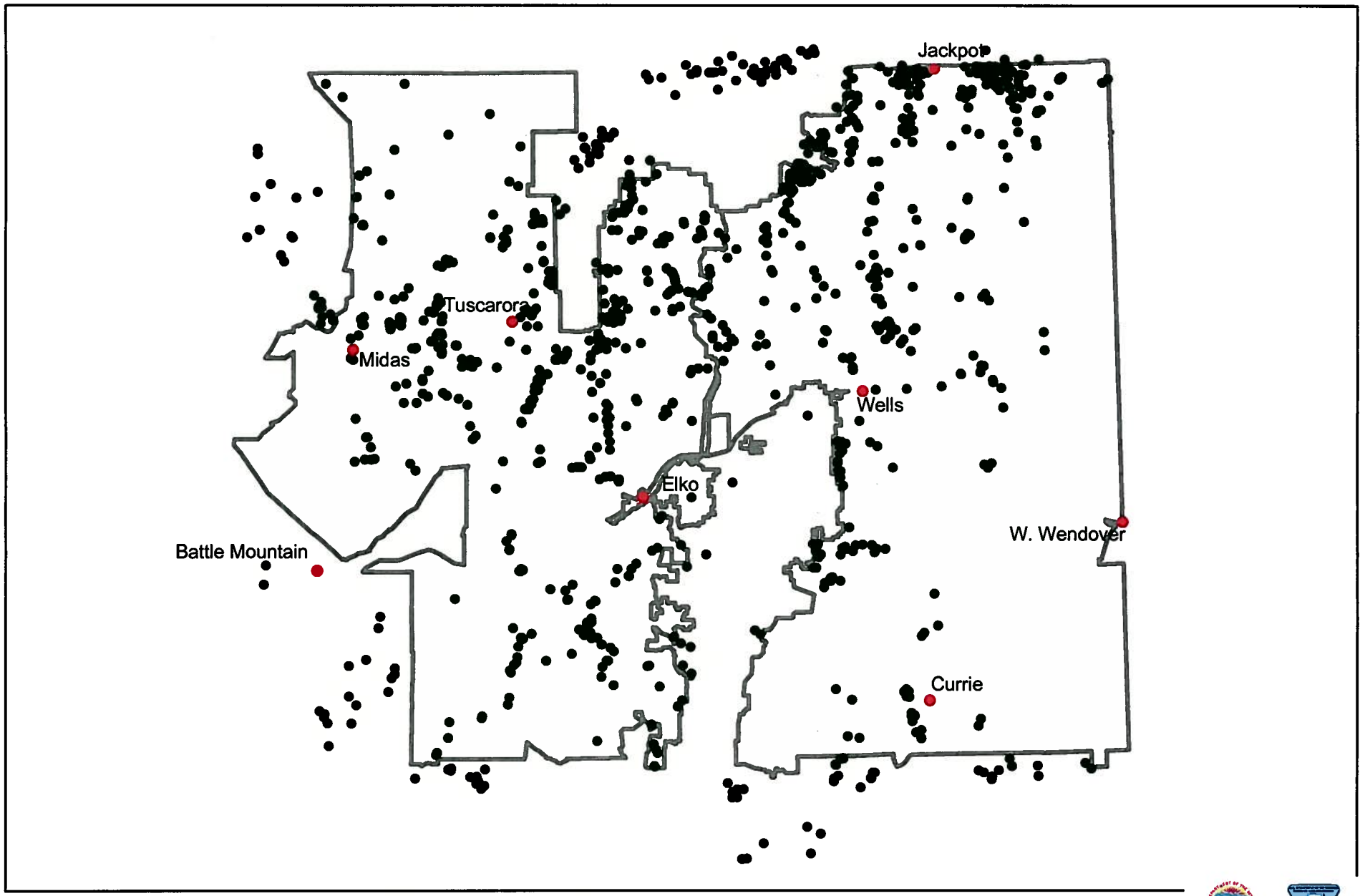
c) All surface disturbances occurring in potential or known habitat areas shall be reclaimed as soon as possible in such a way as to result in conditions suitable for sage grouse habitat.

d) 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.)

Oil & Gas EA

Sage Grouse Leks in the Elko District

3.2.20 Map 1



20 10 0 20 Miles

Legend

- Elko District Leks
- resourceareas polygon

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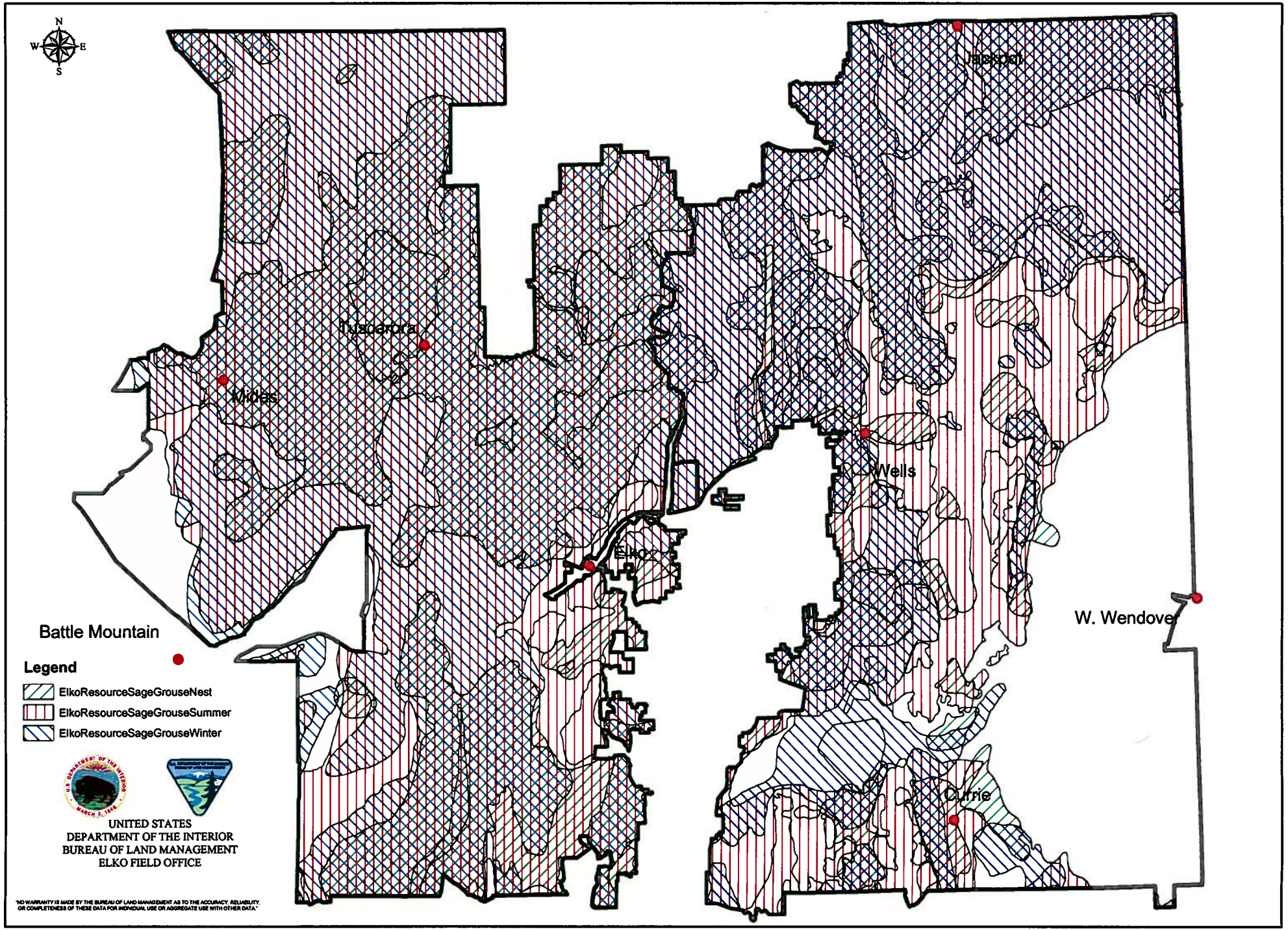
3.2.20 Map 2

Sage Grouse Habitats in the Elko District



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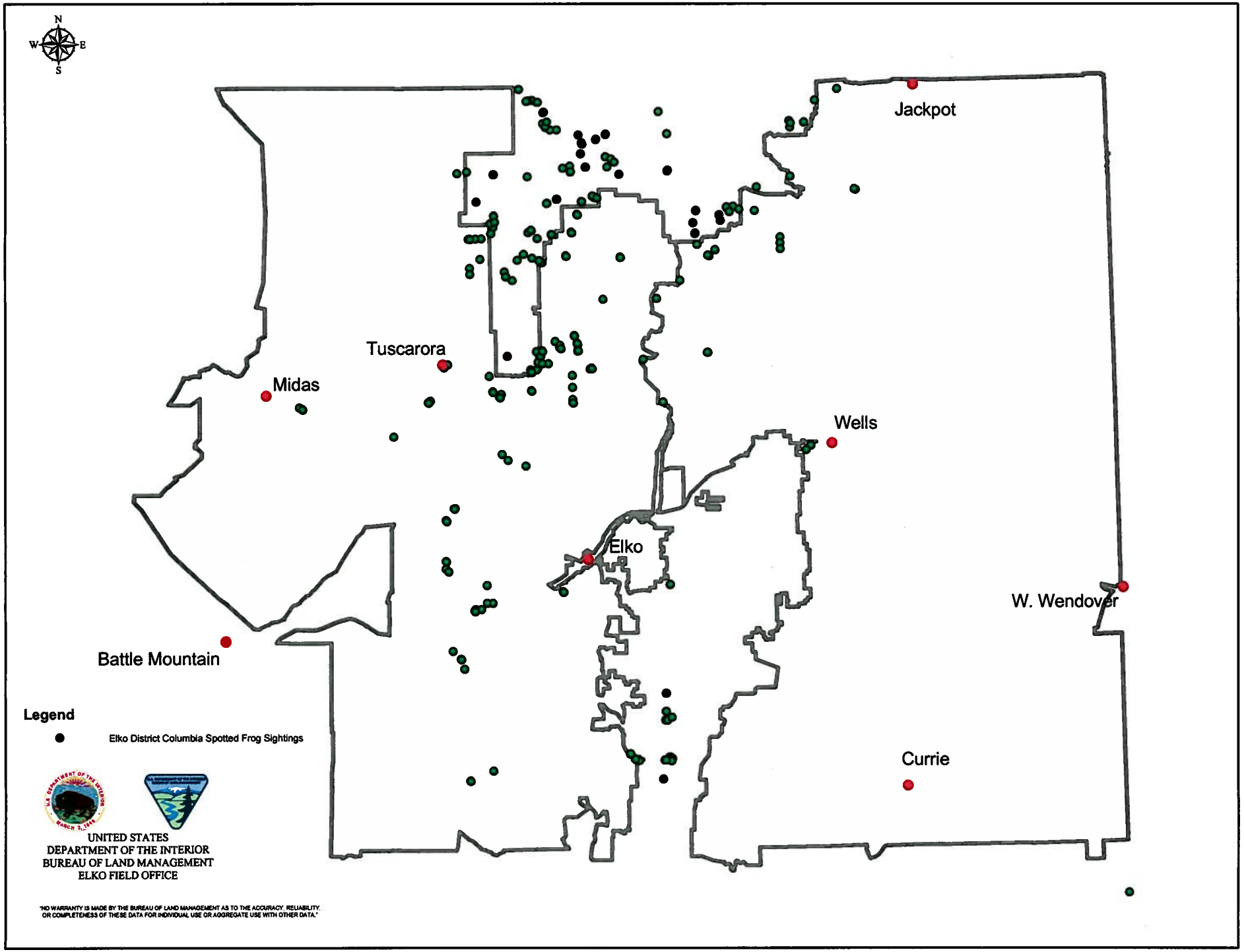
3.2.20 Map 3

Columbia Spotted Frog Sightings in the Elko District



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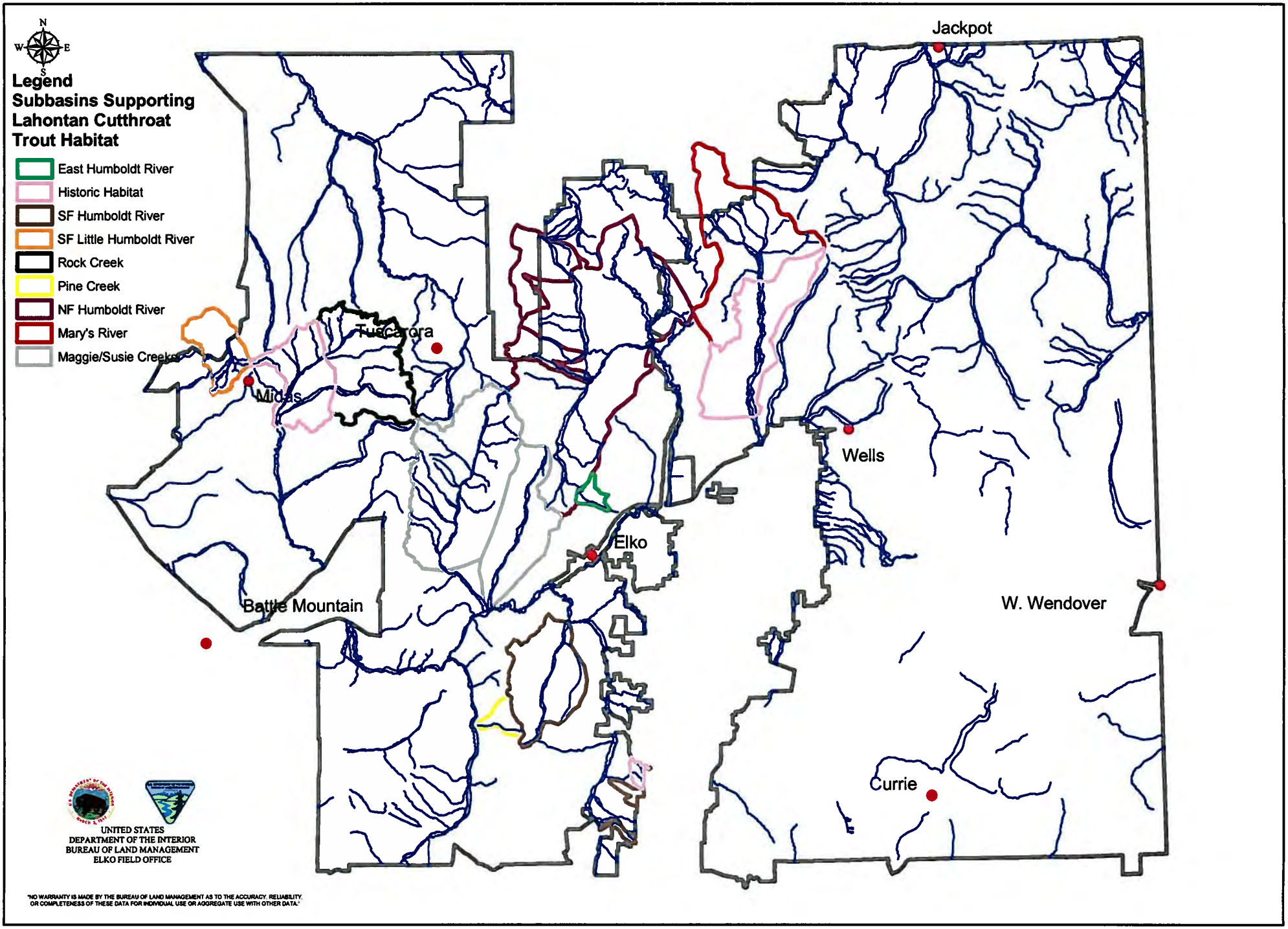
3.2.20 Map 4

Lahontan Cutthroat Trout Habitat in the Elko District



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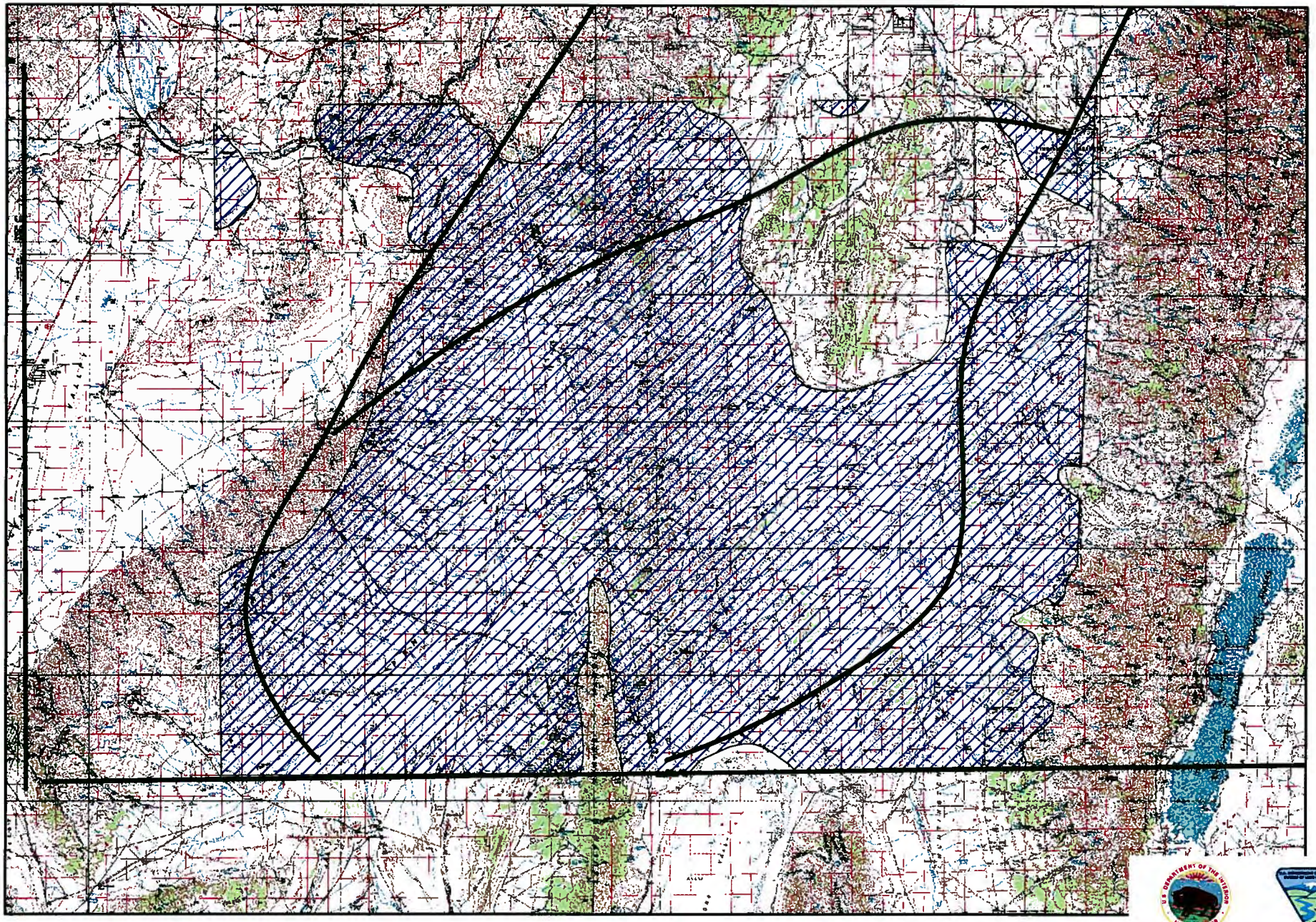
Sage Grouse Nesting Habitat in High Potential Area

3.2.20 Map 5



0 1.25 2.5 5 7.5 10 Miles

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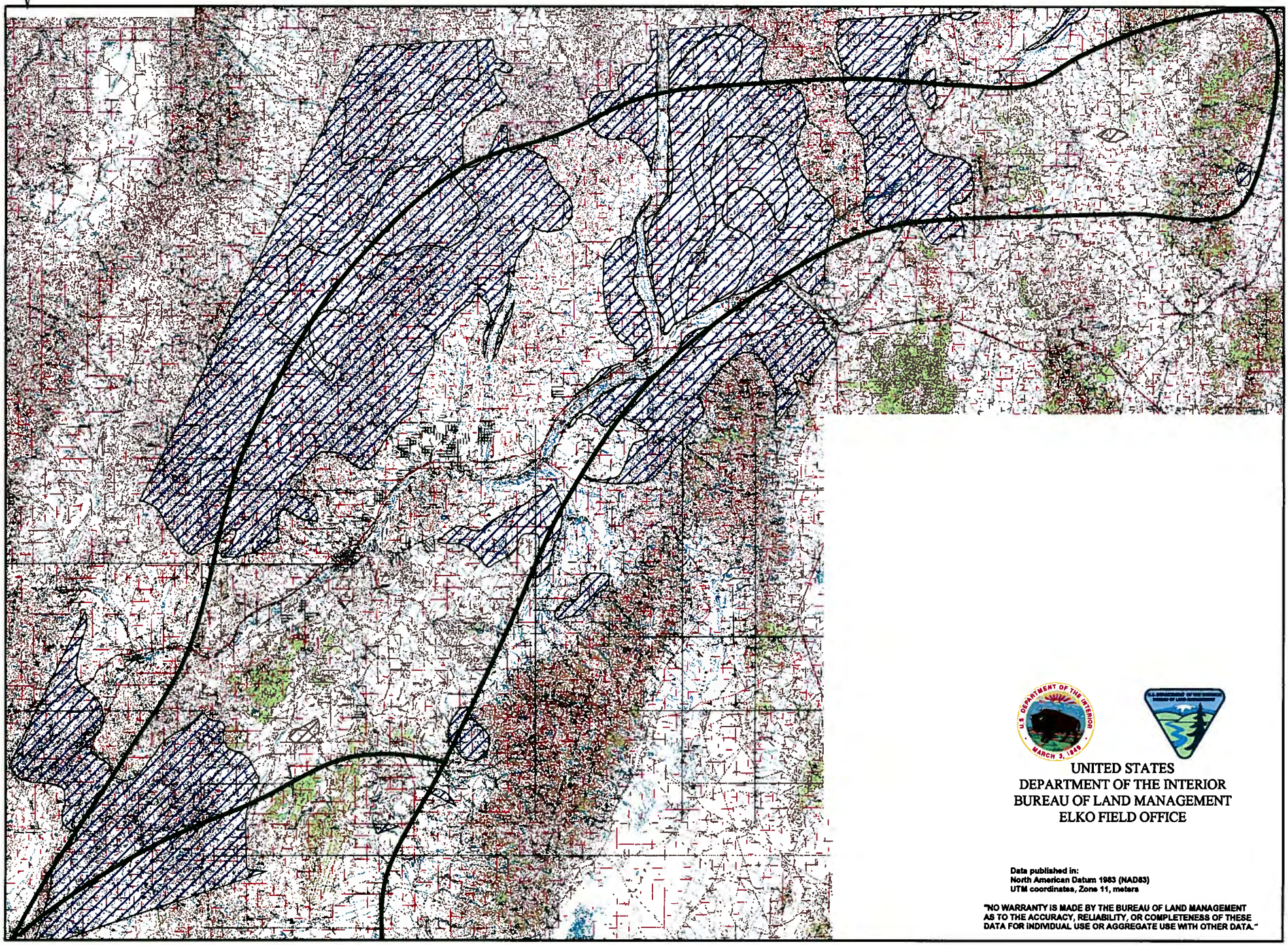
Sage Grouse Nesting Habitat In Intermediate Potential Area

3.2.20 Map 6



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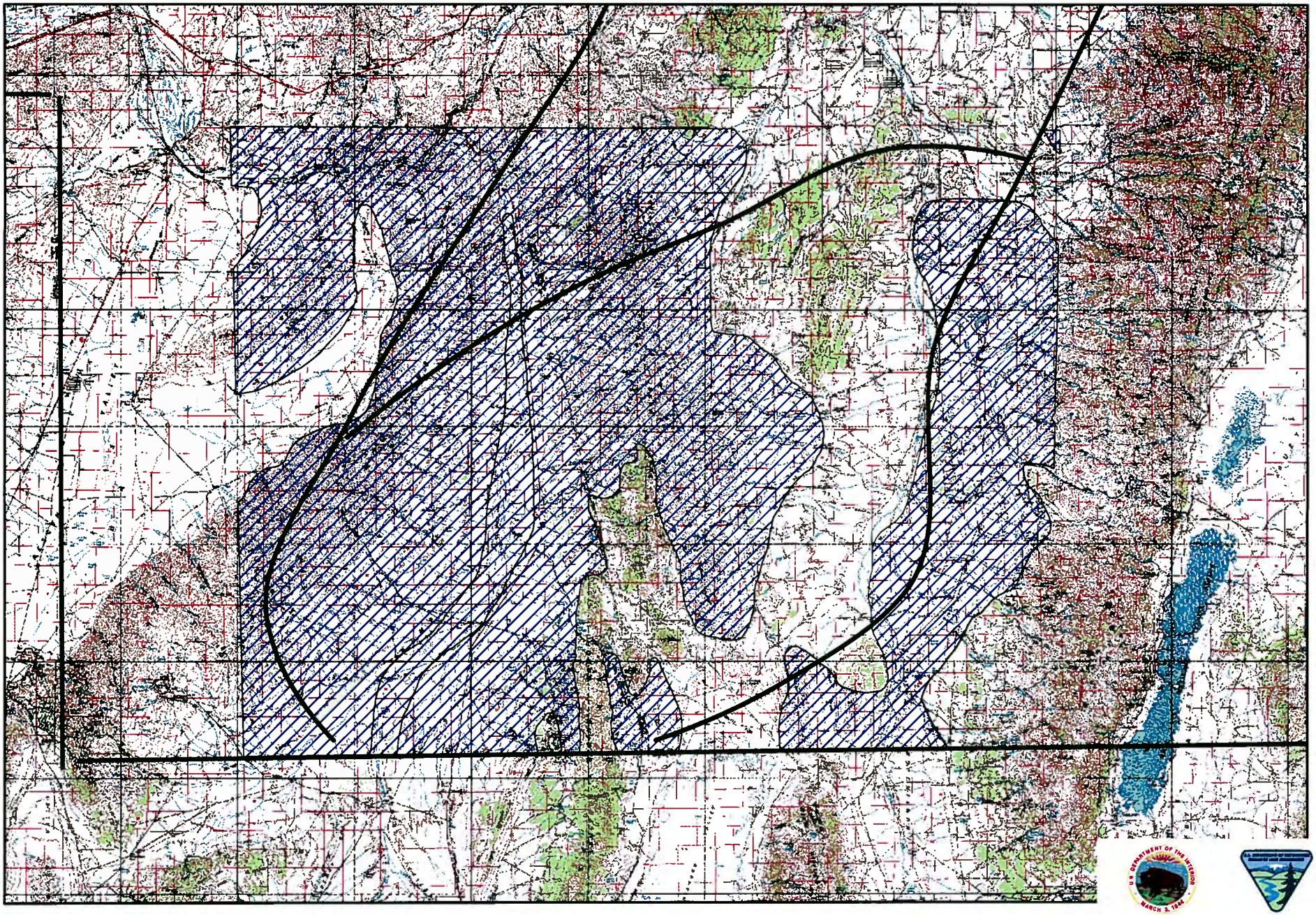
Sage Grouse Crucial Winter Habitat in High Potential Area

3.2.20 Map 7



0 1.5 3 6 9 12 Miles

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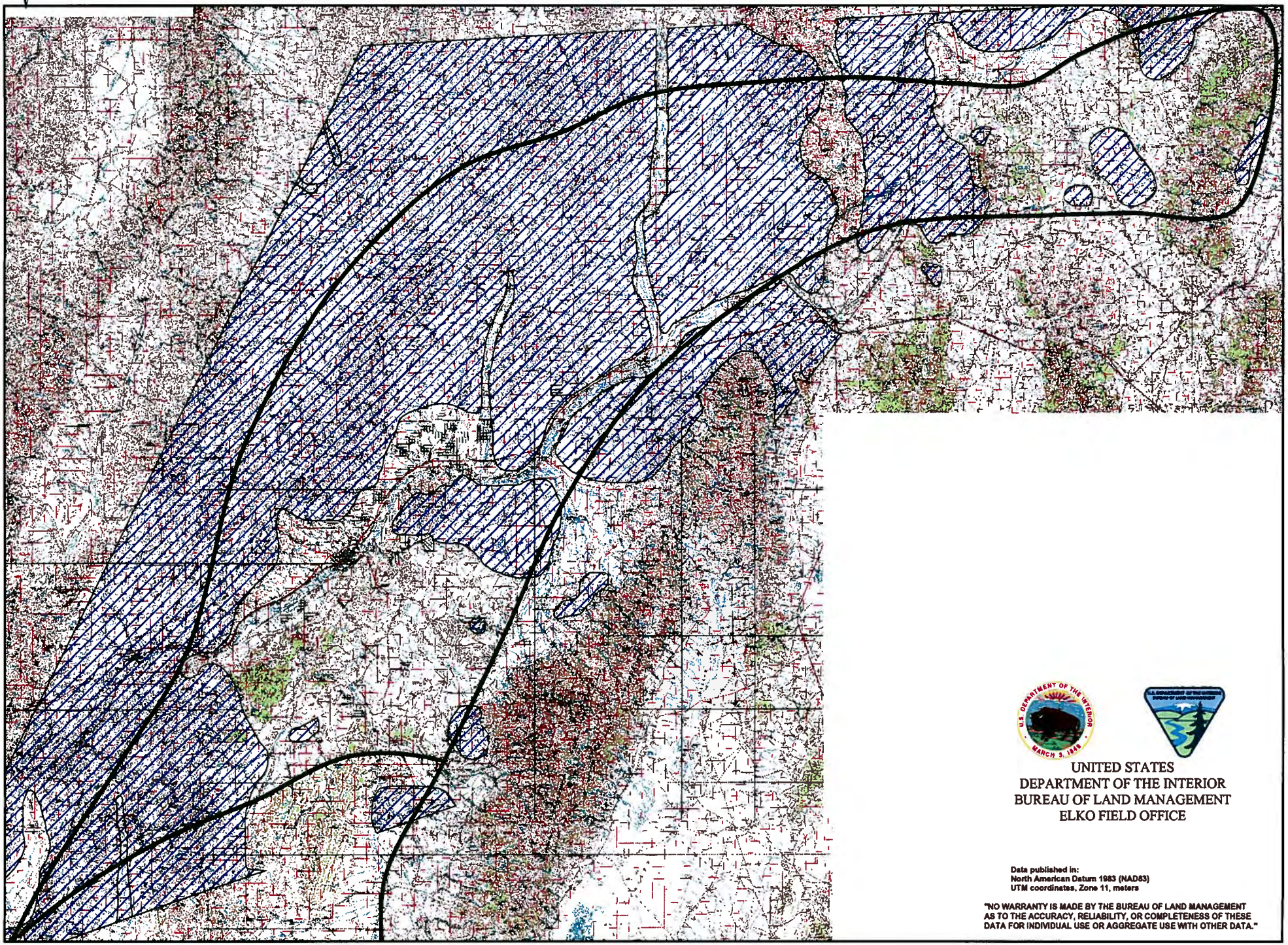
Oil & Gas EA

Sage Grouse Crucial Winter Habitat In Intermediate Potential Area

3.2.20 Map 8



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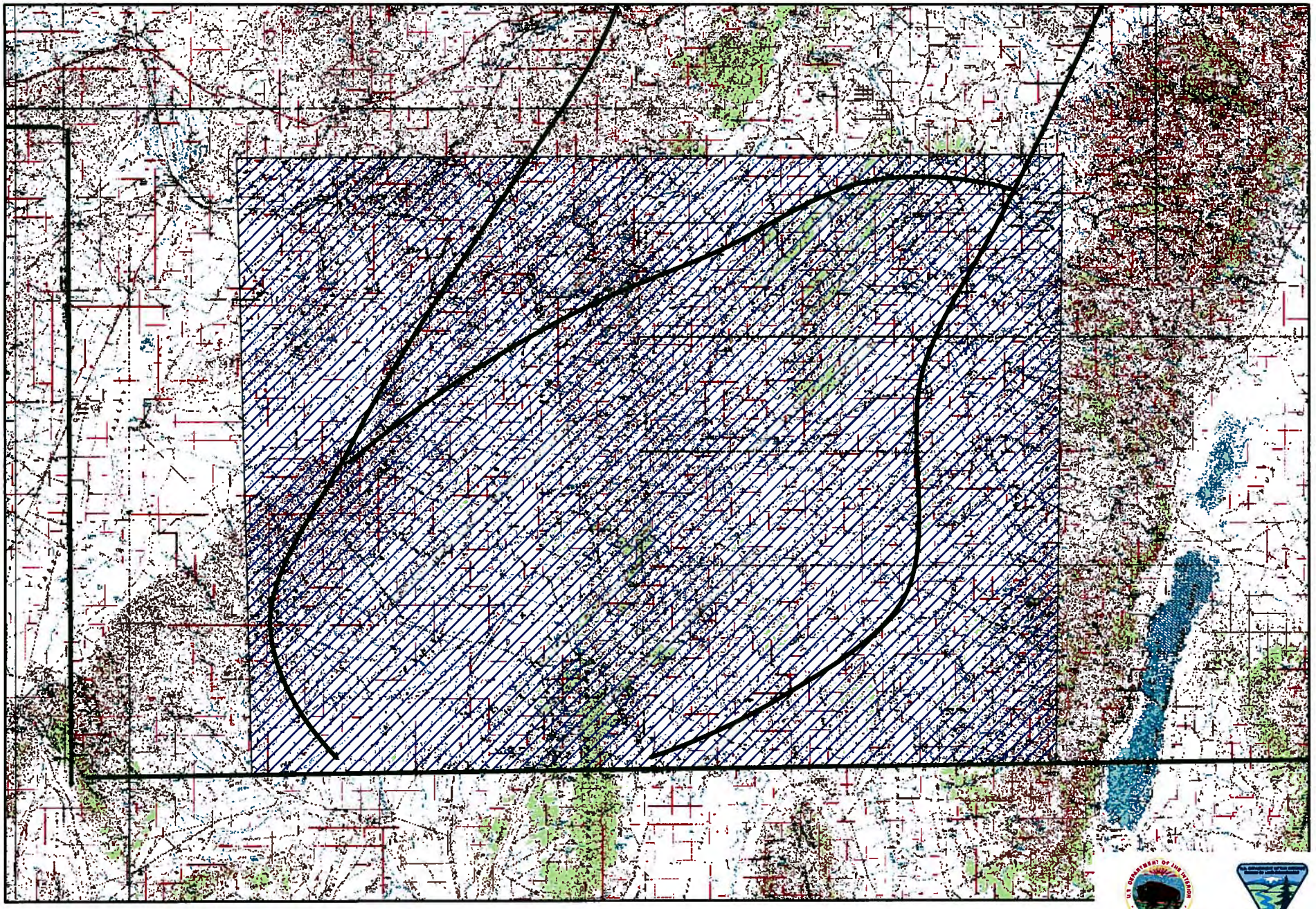
3.2.20 Map 9

Sage Grouse Summer Habitat in High Potential Area



0 1.5 3 6 9 12 Miles

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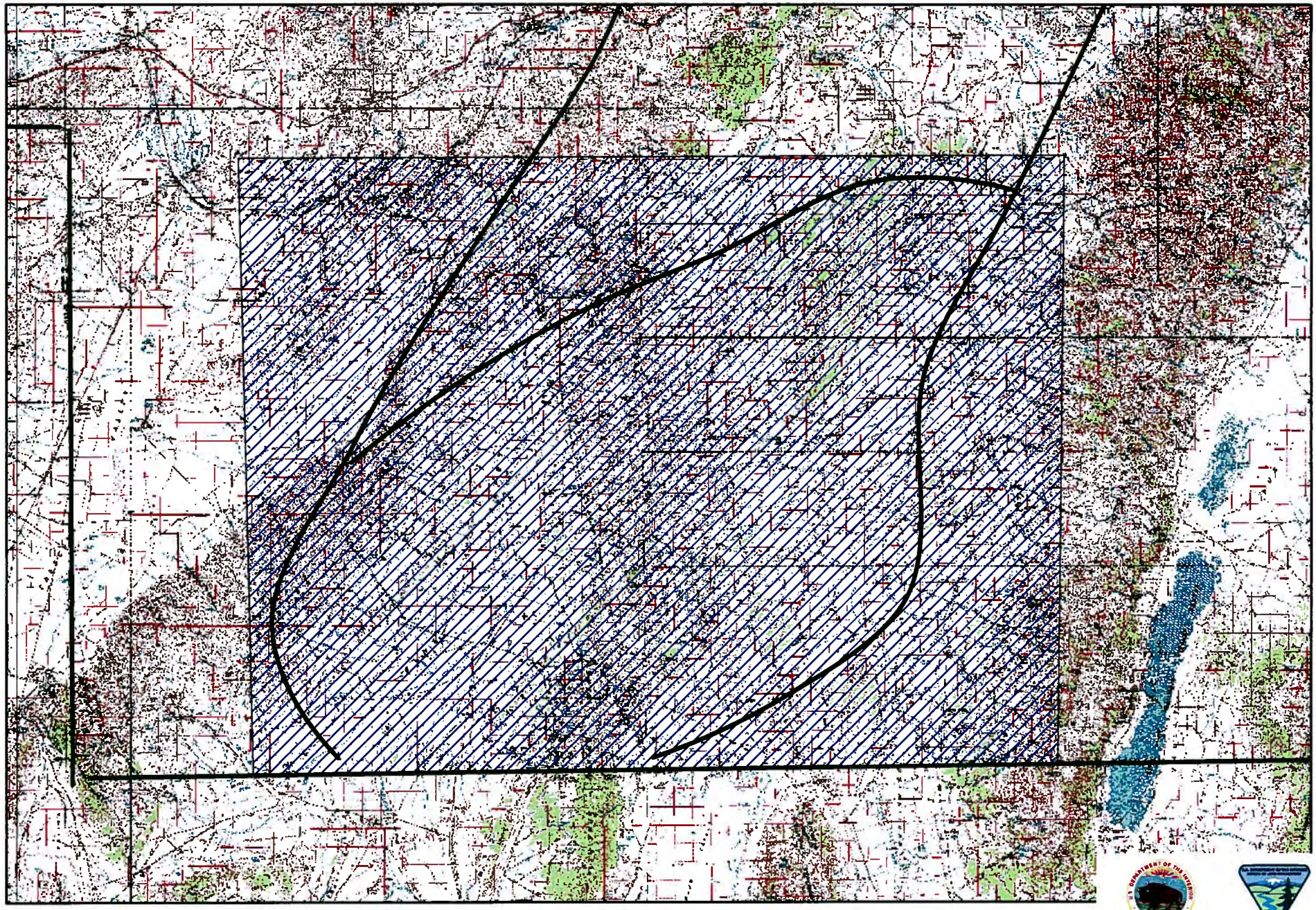
3.2.20 Map 9

Sage Grouse Summer Habitat in High Potential Area



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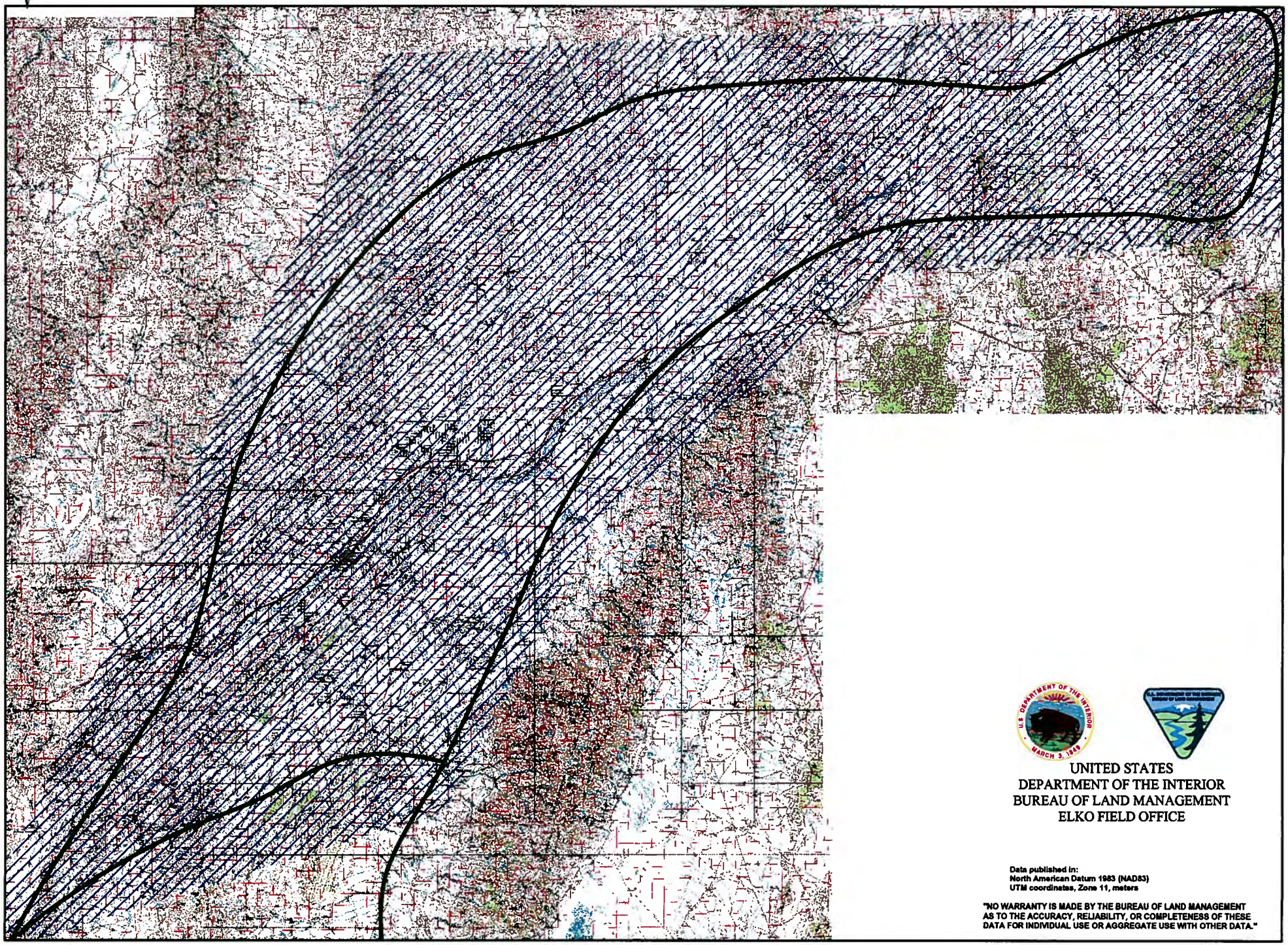
Sage Grouse Summer Habitat In Intermediate Potential Area

3.2.20 Map 10



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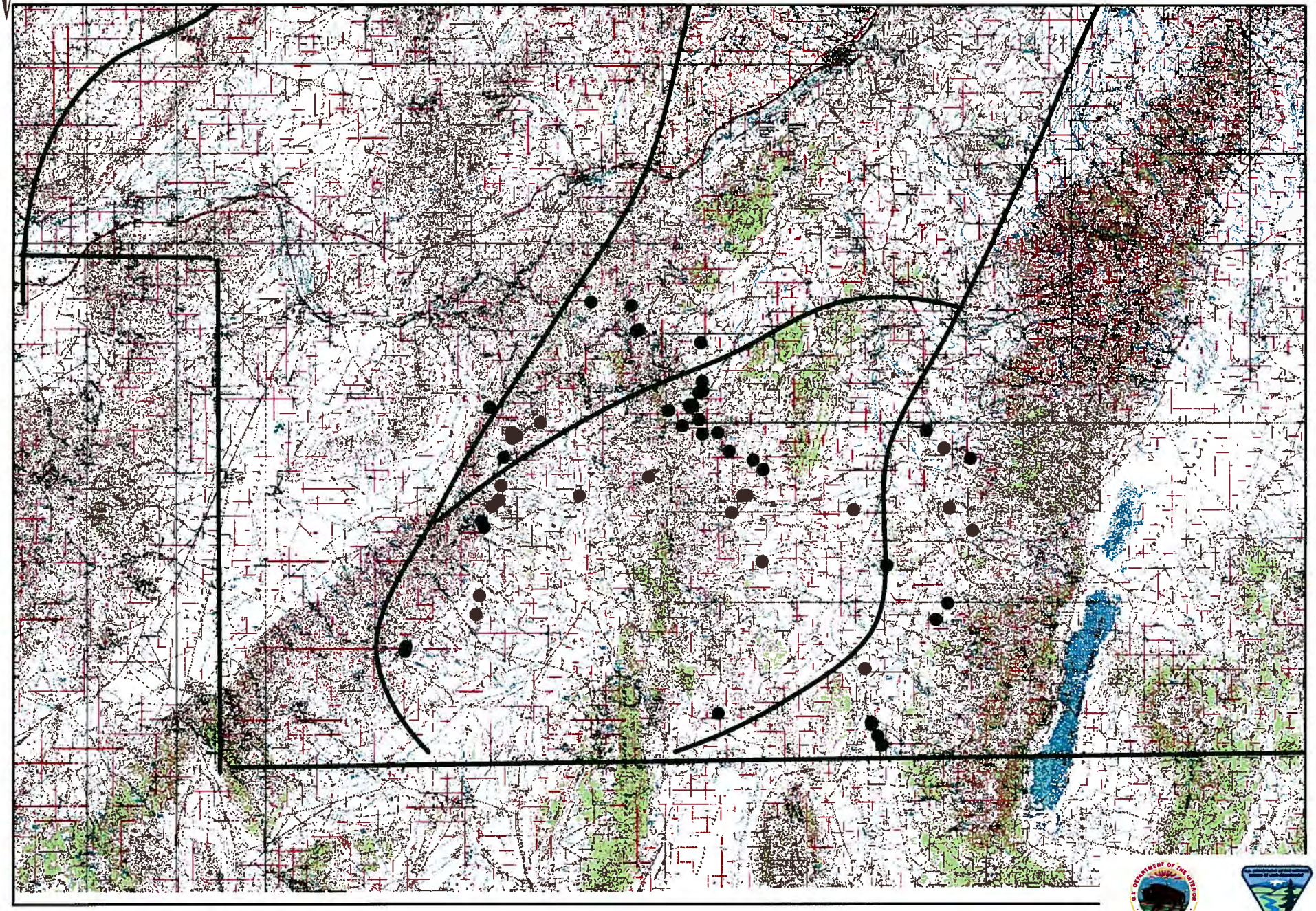
Oil & Gas EA
Lek Grounds in High Potential Area

3.2.20 Map 11



0 1.5 3 6 9 12 Miles

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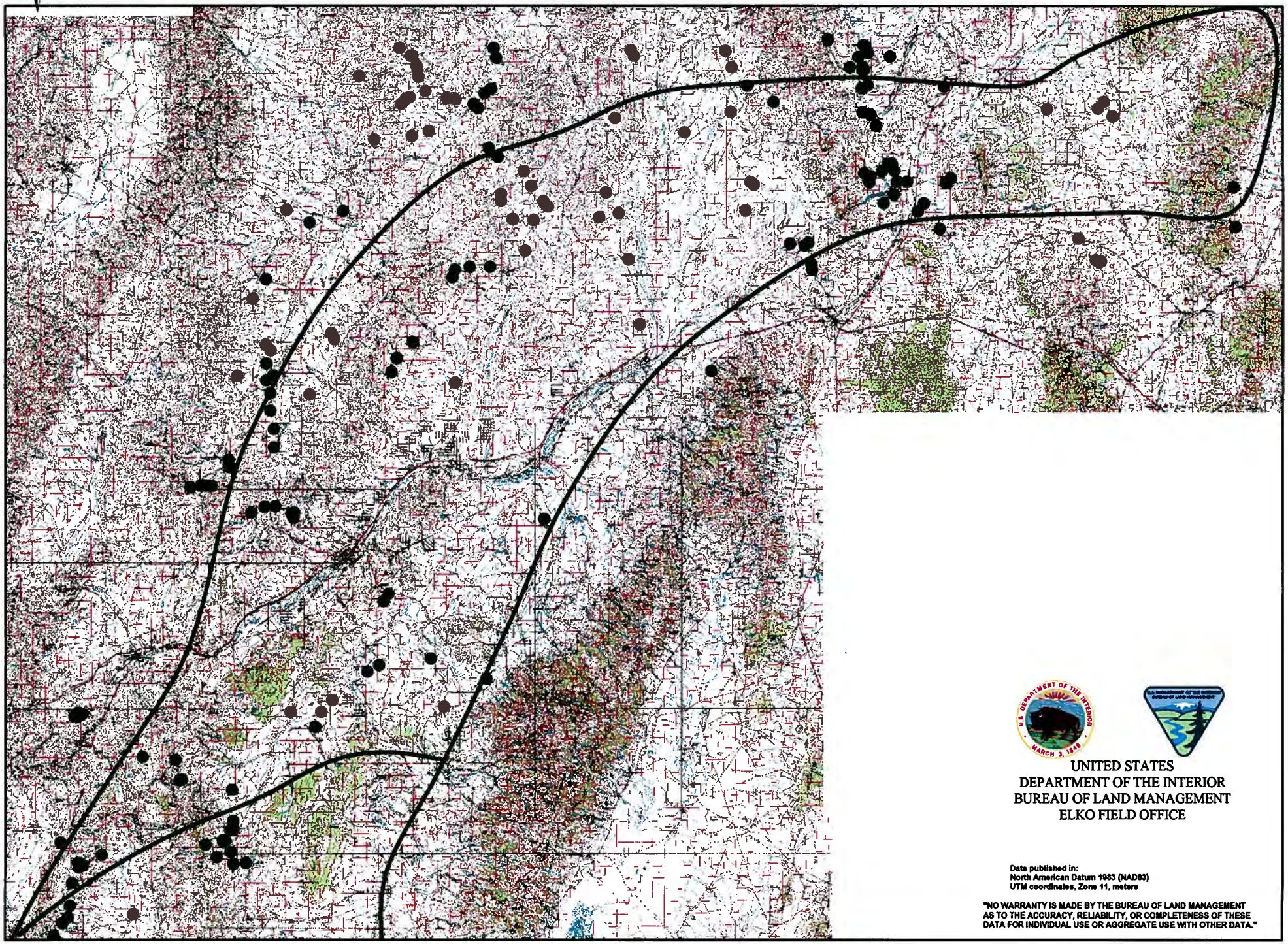
Lek Grounds in Intermediate Potential Area

3.2.20 Map 12



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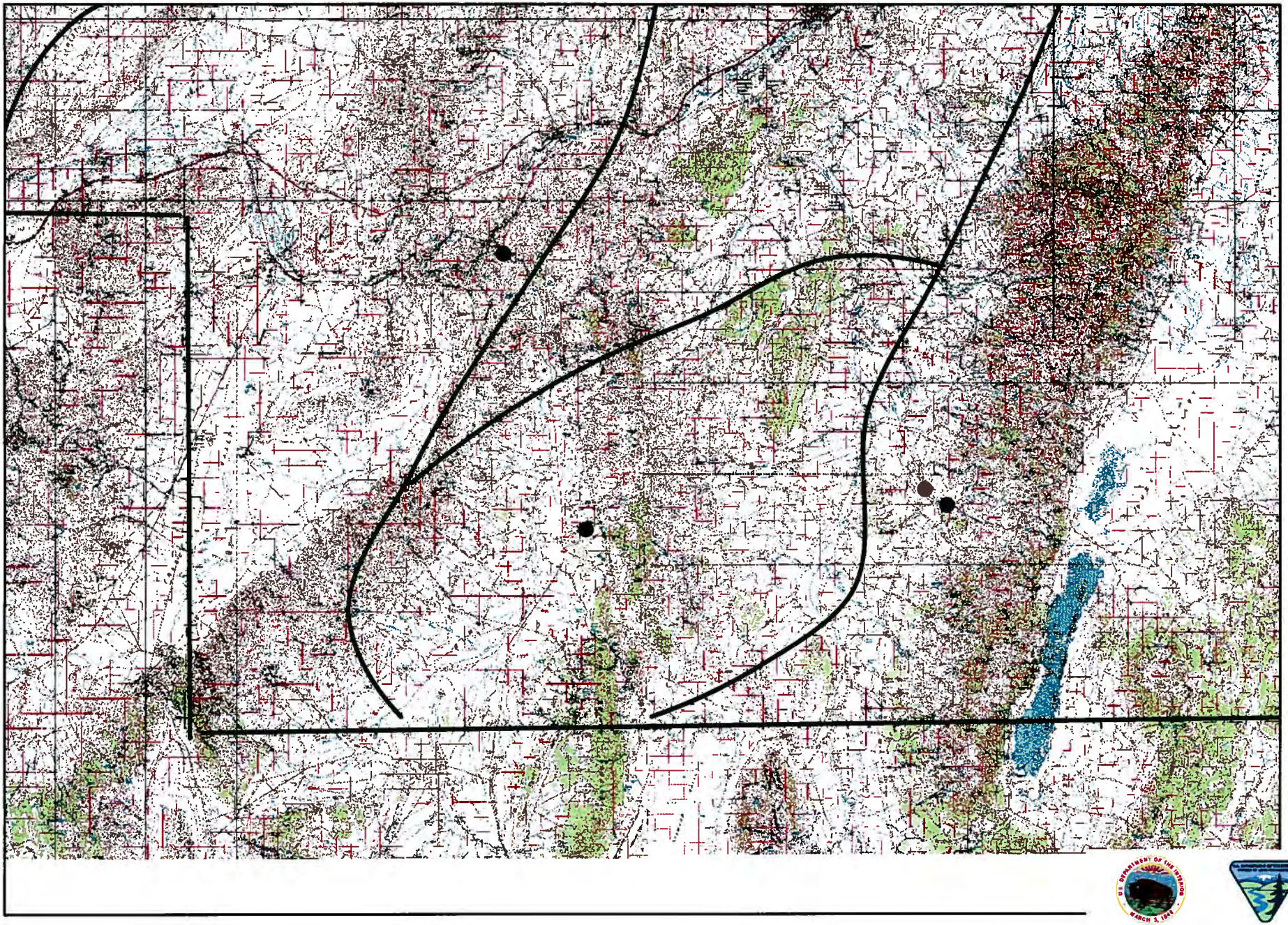
Oil & Gas EA
Spotted Frog Sightings in High Potential Area

3.2.20 Map 13



Miles
0 2 4 8 12 16

Data published in:
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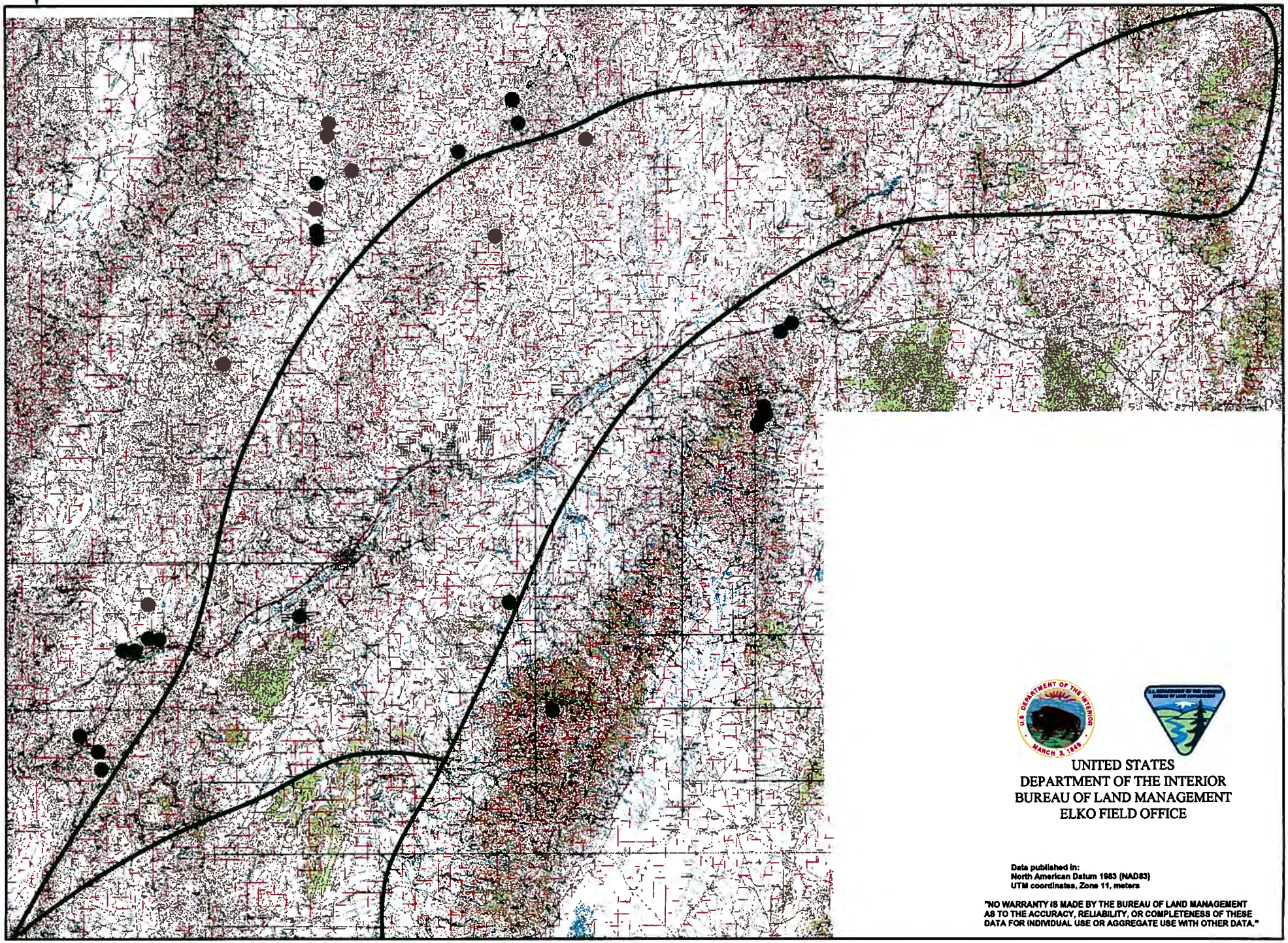
Spotted Frog Sightings in Intermediate Potential Area

3.2.20 Map 14



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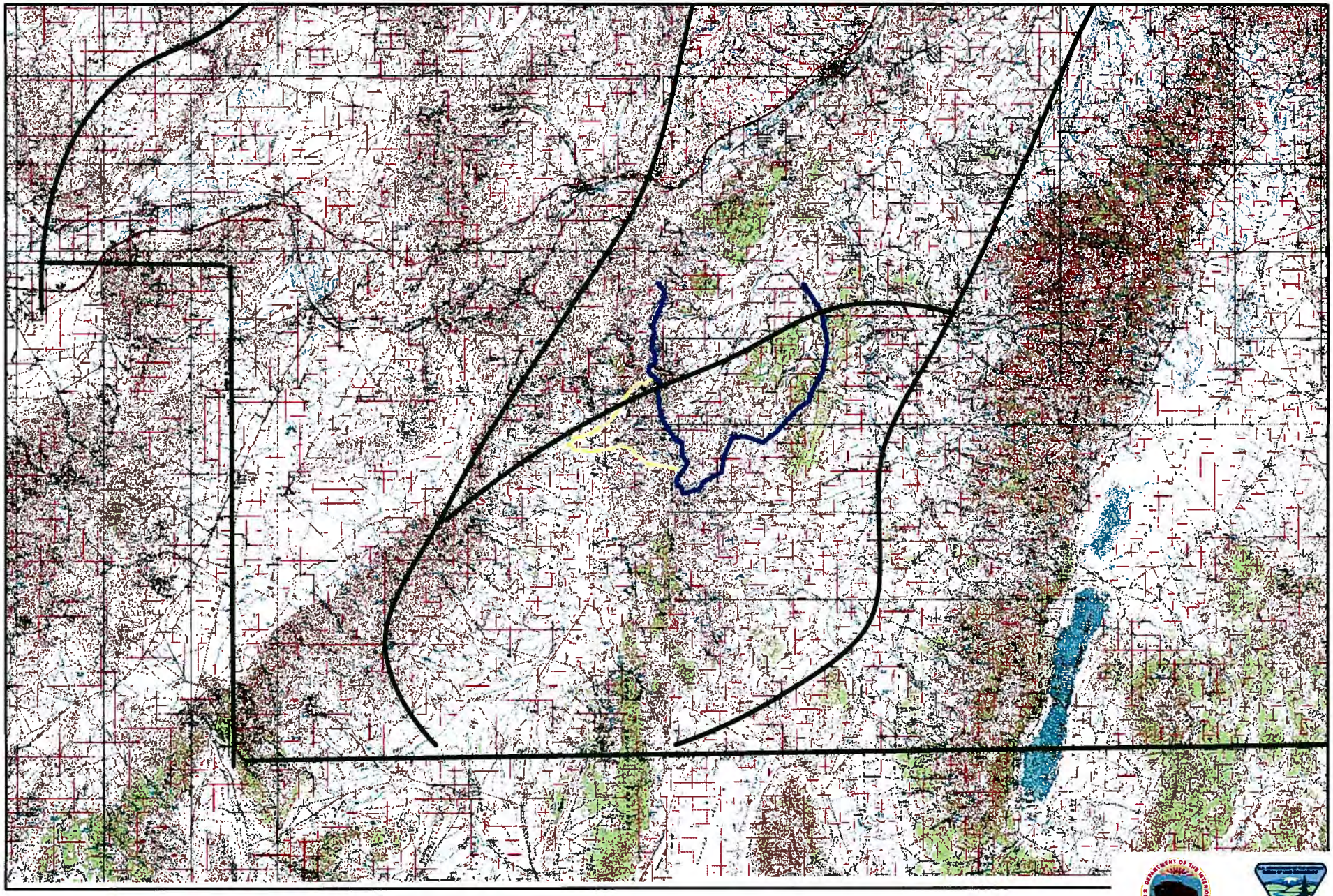
Oil & Gas EA
Subbasins Supporting LCT Habitat in High Potential Area

3.2.20 Map 15



Miles
0 2 4 8 12 16

SF Humboldt River
Pine Creek

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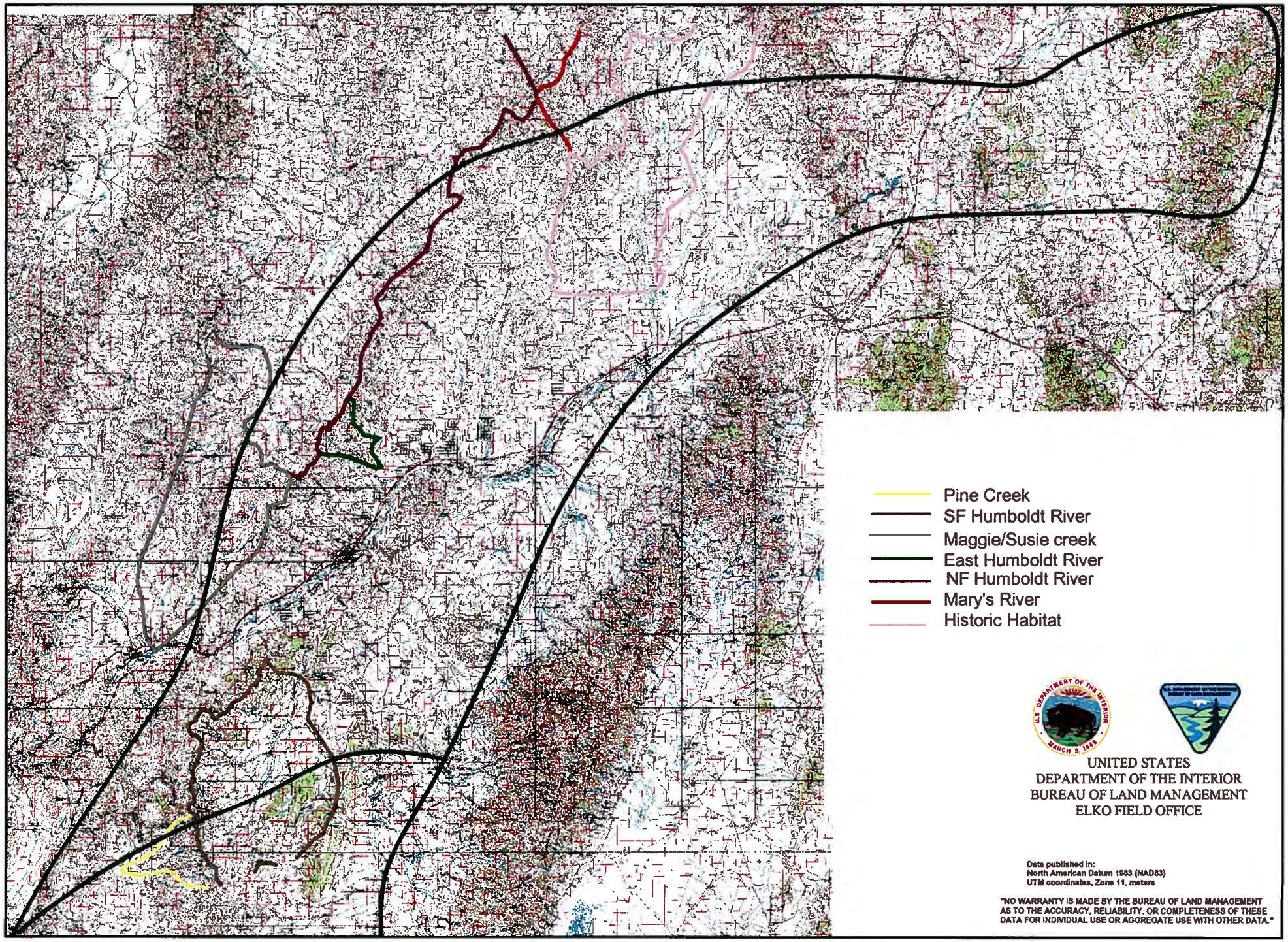
Subbasins Supporting LCT Habitat in Intermediate Potential Area

3.2.20 Map 16



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
ELKO FIELD OFFICE

Data published in:
North American Datum 1983 (NAD83)
UTM coordinates, Zone 11, meters

4 – CONSULTATION AND COORDINATION

4.1 PERSONS, GROUPS OR AGENCIES CONSULTED

4.1.1 Public Scoping

Scoping information was sent out on August 12, 2005, and an open house was held on August 22, 2005. The public comment period closed on September 12. Six written comments were received, three supporting oil and gas leasing, one addressing tribal interest in some parcels nominated for leasing, and two addressing environmental concerns.

4.1.2 Coordination with Other Agencies and Tribes

Nine tribal entities were notified of the proposed oil and gas leasing sale. Three of those entities participated in the scoping process. A discussion of the results of coordination is included in the section on Native American Concerns (3.2.13), and consultation to address tribal concerns is ongoing.

4.2 LIST OF PREPARERS

Kirk Laird, Project Lead, Geology/Minerals, Socio-economics
Lorrie West, Land Use Plan Conformance, NEPA Compliance
Tim Murphy, Cultural Resources
Gerald Dixon, Native American Concerns
Tamara Hawthorne, Recreation, Wilderness, Visual Resource Management
Nycole Burton, Wildlife, Aquatics, Wetlands/Riparian Zones, Special Status Species
Tyson Gripp, Grazing, Vegetation, Forest Resources
Marvin Urban, Lands/Realty
Mark Coca, Invasive Non-native Weed Species
Mark Dean, Soil, Water, Air

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APPENDIX A
LIST OF NOMINATED PARCELS

APPENDIX B
ELKO FIELD OFFICE STIPULATIONS FOR OIL AND GAS LEASING

OG-010-05-01

LEASE STIPULATION: Threatened, Endangered, and Special Status Species

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it complete its obligations under applicable requirements of the Endangered Species Act as amended, 16 U>S>C> &1531 et seq., including completion of any required procedure for conference or consultation.

Authority: BLM Washington Office Instruction Memorandum 2002-174; Endangered Species Act

OG-010-05-02

LEASE STIPULATION: Raptor nesting sites

This lease may contain lands with active raptor nesting sites. These lands are subject to seasonal protection from disturbance to avoid displacement and mortality of raptor young.. Restrictions apply up to a 0.5 mile radius around the active nesting sites of the following species during the period described. The entire Elko District may provide suitable nesting for one or more of the species listed below.

a) Golden Eagles and Great Horned Owls during the period 1/1-6/30, inclusive.
b) Long-eared Owls during the period 2/1-5/15, inclusive.
c) Prairie Falcons during the period 3/1-6/30, inclusive.
d) Ferruginous Hawks, Northern Harriers, and Barn Owls during the period 3/1-7/31, inclusive.
e) Goshawk and Sharp-shinned Hawks during the period 3/15-7/15, inclusive.
f) Cooper's Hawks, Kestrels, and Burrowing Owls during the period 4/1-6/30, inclusive.
g) Red-tailed and Swainson's Hawk during the period 4/1-7/15, inclusive.
h) Short-eared Owls during the period 2/1-6/15, inclusive.

Authority/Supporting Documentation: Wells RMP ROD (p. 25); Elko RMP ROD (p. 25), Birds of the Great Basin, 1985; State Director Decision: Horse Canyon Decision, 2005;

OG-010-05-03

LEASE STIPULATION: Cultural resources

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 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.

Authority: BLM Washington Office Instruction Memorandum 2005-03

OG-010-05-04

LEASE STIPULATION: Mule Deer Crucial Winter Range

This lease contains lands which have been identified as mule deer crucial winter range (BLM EA 2005/030, September 2005). These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during the winter. A map of mule deer crucial winter range can be found in BLM EA 2005-030.

a) Seasonal restrictions from disturbance in mule deer crucial winter ranges apply during the period 11/15-3/16, inclusive.

Authority/Supporting Documentation: Wells RMP ROD (p. 10); Elko RMP ROD (pg. 3); Field Guide to Mammals (1976)

OG-010-05-05

LEASE STIPULATION: Pronghorn Antelope Crucial Winter Range

This lease contains lands which have been identified as pronghorn antelope crucial winter range(BLM EA 2005/030, September 2005). These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during the winter. A map of pronghorn antelope crucial winter range can be found in BLM EA 2005/030.

a) Seasonal restrictions from disturbance in pronghorn antelope crucial winter ranges apply during the period 11/15-3/16, inclusive.

Authority/Supporting Documentation: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3); Field Guide to Mammals (1976)

OG-010-05-06

LEASE STIPULATION: Pronghorn Antelope Kidding Areas

This lease contains lands which have been identified as pronghorn antelope kidding areas (BLM EA 2005/030, September 2005). These lands are subject to seasonal protection from disturbance to avoid displacement and mortality to animals during kidding season. A map of pronghorn antelope kidding areas can be found in BLM EA 2005/030.

a) Seasonal restrictions from disturbance in pronghorn antelope kidding areas apply during the period 5/1-6/30, inclusive.

Authority/Supporting Documentation: Elko RMP (pg. 2-6), ROD, Field Guide to Mammals (1976)

OG-010-05-07

LEASE STIPULATION: Sage Grouse Strutting Ground (Leks)

This lease contains lands which have been identified as sage grouse strutting grounds (leks) that are subject to seasonal protection from disturbance. A map of known sage grouse leks as of May 2005 can be found in BLM EA 2005/030. Additional leks may be identified in the future.

a) No Surface Occupancy is permitted within 0 .5 miles, or other, lesser, appropriate distance based on site-specific conditions, of sage grouse leks.

Authority/Supporting Documentation: Wells RMP ROD (p. 10); Elko RMP ROD (p. 35); Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000; State Director Decision: Horse Canyon Decision, 2005

OG-010-05-08

LEASE STIPULATION: Sage Grouse Brood Rearing Areas

This lease contains lands which have been identified as sage grouse brood rearing areas that are subject to seasonal protection from disturbance.

a) 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.

Authority/Supporting Documentation: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3 and 36) Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000, State Director Decision: Horse Canyon Decision, 2005

OG-010-05-09

LEASE STIPULATION Sage Grouse Crucial Winter Habitat

This lease contains lands which have been identified as sage grouse crucial winter habitat that are subject to seasonal protection from disturbance. This stipulation does not apply to operating facilities.

a) Seasonal restrictions from disturbance in sage grouse crucial winter habitat apply during the period November 1 to March 15.

Authority/Supporting Documentation: Wells RMP ROD (p. 22 and 25); Elko RMP ROD; Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, 2000;

OG-010-05-10

LEASE STIPULATION I-80 "low visibility corridor"

This parcel includes lands within the I-80 Visual Corridor. Visual impacts are to be minimized within 1.5 miles on either side of Interstate 80. Within this three-mile wide Low Visibility Corridor, the objective is for management actions not to be evident in the characteristic landscape. Management objectives for Class II VRM areas will be used as a guideline when evaluating projects within the Low Visibility Corridor. 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 may 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.

Authority: Wells RMP ROD (p. 3); Elko RMP ROD (p. 1); Elko Field Office IM NV-2004-013)

OG-010-05-11

LEASE STIPULATION Special Recreation Management Areas

This parcel includes lands within a Special Recreation Management Area (South Fork Canyon SRMA, Wild Horse SRMA, Wilson Reservoir SRMA, South Fork Owyhee River SRMA, Zunino/Jiggs SRMA, or proposed Salmon Falls Creek SRMA) that are within ½ mile of the high water line. No surface occupancy is allowed within ½ mile of the high water line.

Authority: Wells RMP ROD (p. 25); Elko RMP ROD (p. 3)

OG-010-05-12

LEASE STIPULATION Tabor Creek Campground

This parcel includes lands within the Tabor Creek Campground area. No surface occupancy is allowed on lands within the designated boundaries of Tabor Creek Campground: T41N R61E, S1/2 Section 16, S1/2SE1/4 Section 16, E1/2 Section 20, Section 21, NW1/4Section 28, Section 29.

Authority: Wells RMP ROD (p. 25)

OG-010-05-13

LEASE STIPULATION Congressionally designated historic trails

This parcel includes lands within one mile of the center of Congressionally designated historic trails. Fluid mineral leasing activities within one mile of the center of Congressionally designated historic trails may be limited or modified to protect the historical and scenic values of the trails.

Authority: Nevada BLM Instruction Memorandums 2004-004 and 2004-006

APPENDIX C
REASONABLY FORESEEABLE DEVELOPMENT SCENARIO FOR OIL AND GAS

REASONABLY FORESEEABLE DEVELOPMENT SCENARIO FOR OIL AND GAS RESOURCES

The following reasonably foreseeable development scenario (RFDS) for the Elko District is based in part on the development history observed within Railroad Valley, as well as the observed development history in the Elko District's Pine Valley. Railroad Valley is located within the same geologic province as the Elko District and has been subjected to similar depositional, tectonic and thermal history as the southern portion of the Elko Resource Area. Railroad Valley is the site of the first producing oil fields within Nevada. We expect any future development within the Elko District will be similar to Railroad Valley. This RFDS, based on a fifteen year projection, was created as an assumption for analysis in order to estimate environmental impacts including direct, indirect, and cumulative impacts. This scenario notes that most exploration and development is expected in the Pine Valley area as that is the area in which discoveries have occurred in the past. For geologic reasons, the further east and north from Pine Valley, the less likely the possibility of discovering economic quantities of oil and gas.

ASSUMPTIONS FOR GEOPHYSICAL EXPLORATION: The assumptions for geophysical exploration used for the preparation of this reasonable foreseeable development scenario are based on the actual geophysical exploration activities in Railroad Valley between 1954 and 1989, and in the Elko Resource Area between Oct. 1, 1979 and Jan. 29, 1991. These dates represent the most active period of exploration in the Elko District. In recent years, exploration has been nearly curtailed due to cyclical commodity prices, environmental regulation uncertainty, and a lack of exploration success. The last geophysical survey for oil and gas was in 2000. Table 4-1 displays the data available for the Elko Resource Area from Fiscal Year 1980 to 1990.

TABLE 4-1 GEOPHYSICAL SURVEYS IN THE ELKO RESOURCE AREA

FISCAL YEAR	MILES OF SURVEY	
1980	180.5	
1981	252.0	
1982	281.0	
1983	62.0	
1984	73.0	
1985	64.0	
1986	111.0	
1987	24.0	
1988	49.0	
1989	108.0	
1990	14.0	
TOTAL	1218.5	(AVERAGE 110.7)

Within the Elko Resource Area, the subsurface geology is not always accurately represented by the surface outcrop and it is for this reason exploration geologist use geophysical methods to help locate oil and gas traps. Geophysical exploration includes a variety of instruments and techniques but all geophysical exploration is based on the measurement of one of three physical properties: A) Gravitation field, B) Magnetic field,and C) Seismic reflection characteristics.

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A detailed description of typical geophysical operations are given in Appendix C. Of those described, only seismic reflection surveys result in detectable surface disturbance. Initial geophysical surveys may cross tens of miles in what will appear to be a random pattern. These surveys attempt to piece together the local subsurface geology or confirm geologic inference. If real or perceived geologic structures of interest are located, surveys of specific areas will be intense and may be repeated frequently.

There will be an estimated average of 110 miles of line surveyed per year over the life of this projection. This will vary from as many as 300 to as few as 10 miles of line in any one year. Each year up to 182 acres will be disturbed from seismic surveys. Usually, such disturbance includes crushing and destruction of brush, but survival of the understory of grasses. In steep or wet areas, the grasses may also be destroyed. In either case, reclamation will be completed on these lines within one year.

ASSUMPTIONS FOR EXPLORATION DRILLING: The exploration drilling assumptions that are used in this reasonable foreseeable development scenario were made after review of the oil and gas drilling activities in Railroad Valley between 1954 and 1989, and in the Elko Resource Area between October 1, 1979 and January 29, 1991. These dates were the most active exploration period. The Elko District has averaged about two exploration wells per year for the last ten years (Schmidt, per comm., 2004). This pattern is consistent throughout Nevada. The Nevada Bureau of Mines and Geology Mineral Industry Report for 2002 (NBMG, 2003), shows exploration well drilling throughout Nevada to have decreased from a high of 36 wells in 1984 to a total of 16 in the four year period from 1999-2002. Table 4-2 displays the Exploration Drilling data available for the Elko Resource Area from Fiscal Year 1980 to 1991.

TABLE 4-2 SURFACE DISTURBANCE (Acres) CAUSED BY OIL AND GAS EXPLORATION ACTIVITY IN THE ELKO RESOURCE AREA (public and private)

Fiscal Year	No. of Holes	Pipelines	Roads	Pads
1980	2	0	4.8	3.4
1981	3	0	19.6	6.3
1982	5	0	26.5	9.7
1983	3	0.24	4.5	4.0
1984	3	0	21.8	7.6
1985	7	0	15.6	18.7
1986	1	0	2.4	3.7
1987	4	0	2.6	6.0
1988	1	0	89.7	7.0
1989	3	0	4.3	6.9
1990	4	0	6.2	6.0
1991	1	0	2.2	2.1
SUM	37	0.24	200	81.3
AVERAGE (acre/year)	3.1/year	0.002	16.7	6.8
AVERAGE WIDTH	NA	NA	31 ft.	NA
AVERAGE LENGTH	NA	NA	7490 ft.	NA

****

There have been over 70 recorded exploration wells for oil and gas within the Elko District. The search for oil and gas has been more or less continuous since the 1950's. Currently, there are five producing oil and gas wells in four different fields in the planning area (public and private lands of Pine Valley).

For the purposes of this analysis, the following assumptions are made for exploration drilling operations:

A) An estimated 80 wells will be drilled during the fifteen year life of this projection.
B) The Elko District is considered to be a high risk (wildcat) exploration region.
C) Approximately 10% of the wells drilled will be producers.
D) An estimated 72 wells will be reclaimed during the life of the plan.
E) Drilling time will average three to four weeks per well.
F) The average pad size including the reserve pit is 2.0 acres.
G) The average access road is 31 feet wide by 1.4 miles long and will have one foot of gravel on the road surface (6740 bank cubic yards).
H) No more than three drill rigs will be operating in the same area at the same time.

DISTURBANCE DURING THE LIFE OF THE PROJECTION: Using the assumptions for exploration drilling combined with the drilling and production history in Railroad Valley, it is projected that the surface disturbance from exploratory and production well pads combined with the construction of service roads and main access roads will result in 481 acres of disturbance. The construction of local pipelines to connect the wells to storage tank facilities will result in 10.6 acres of disturbance. The scenario for the greatest development impact, including a branch and trunk pipeline network to transport oil and gas from the wells to the Carlin oil terminal will result in 236 additional acres of surface disturbance. Gravel sources for construction of roads, pipelines and drill pads will result in 129.6 acres of disturbance. Total surface disturbance during the life of the projection will be 858 acres.

Recontouring and revegetation of the dry well pads, service roads and associated gravel sources will result in 676.8 acres being reclaimed for other uses. Surface disturbance from oil and gas activities would result in a net loss of 181.2 acres of vegetation over the remaining life of the plan.

The valleys will expect 95% (76) of the projected wells. Drilling trends may fluctuate greatly, with no drilling occurring in as many as five consecutive years. On the other hand, in any ten year period, nearly half of the wells which are projected to be drilled in the area will be drilled. Each new discovery will foster an increase in drilling activity which may last for two to three years.

ASSUMPTIONS FOR PRODUCTION: The average geographic area for a producing oil and gas fields in the United States is about 640 acres. Field sizes tend to be smaller in Nevada. There will be 40-acre spacing for wells less than 5000' in depth and 160-acre spacing for wells more than 5000 feet in depth. Normally, drilling depths are greater than 5000 feet; therefore, most of the well spacing can be expected to be 160 acres.

No more than three drilling or workover rigs will be in operation in a field at the same time.

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Limited reclamation work would occur until the producing field was abandoned. No producing fields will be abandoned during the life of the plan.

As many as four producing fields may be discovered during the life of the plan. These fields are hypothesized to be equivalent in size and surface disturbance to the Kate Springs and Bacon Flat Oil Fields. Of the four projected producing fields, two would be the equivalent to the Kate Springs Field and two would be the equivalent to the Bacon Flat Field. The fields would be as close as one mile and as far as 20 miles from each other. The cost factors involved would usually limit drilling to depths of 6000 feet, although some operators would speculate that larger reservoirs would be encountered at greater depths (10,000 to 15,000 feet). Production rates of each field would range from negligible amounts (10 Barrels of Oil per Day (BOPD) to extremely prolific (6300 BOPD), and the production life of a field would last for 18 months to 35 years.

Assumptions for the Kate Springs Oil Field Equivalent

For the purposes of analysis, it is assumed that during the life of the plan there will be two new small oil fields discovered within the Elko Resource Area that are equivalent in size to the Kate Springs Oil Field. For each of these fields the following assumptions are made:

A) Twenty wells will be drilled. There will be three producing wells, three injection wells and fourteen plugged and abandoned wells in the field.

B) Tank batteries will be placed on existing drill pads and no additional surface disturbance will be required.

C) The field will be six miles from a major pre-existing road. This field will require a major access road six miles long and 40 feet wide with three feet of gravel.

D) Drill pads will be 200 x 250 feet with two and one-half feet of gravel.

E) Two miles of pipeline will be required. The disturbance will be 15 feet in width.

F) 28 miles of 31-foot-wide service roads will be required with two feet of gravel.

G) Gravel will be obtained locally. Gravel pits are assumed to average 12 feet in depth.

At each Kate Springs Equivalent field, there will be a total of 176.7 acres of new surface disturbance resulting from the construction of service roads, main access roads, drill pads, local pipelines and gravel pits. There will be 125 acres of surface disturbance resulting from the construction of service roads and drill pads. The construction of a new main access road will cause an additional 29 acres of new surface disturbance, and the development of a local pipeline network to connect each producing well to the storage tank battery will result in 3.6 acres of new surface disturbance at each field. The development of gravel pits for use in road and pipeline construction will cause 19.2 acres of new surface disturbance. A component breakdown of surface disturbance for the Kate Springs Model is listed on Table 4-3.

Assumptions for the Bacon Flat Oil Field Equivalent

For the purposes of analysis, it is assumed that during the life of the plan there will be two new very small oil fields discovered within the district, that are equivalent in size to the Bacon Flat Oil Field. The following assumptions result:

A) Ten wells will be drilled. There will be 1 producing well, 1 injection well and 8 plugged and abandoned wells in the field.

B) The tank battery will be placed on existing drill pads. Thus, no additional surface disturbance will be required.

C) The field will be three miles from a major existing road requiring construction of a major access road three miles long and 40 feet wide with three feet of gravel.

D) Drill pads will be 200 x 250 feet and will require two and one-half feet of gravel.

E) One mile of pipeline will be required. Surface disturbance is estimated to be 15 feet in width along the pipeline.

F) There will be fourteen miles of access roads 31 feet wide with two feet of gravel.

G) Gravel will be obtained locally. Gravel pits are assumed to average 12 feet deep.

At each Bacon Flat Equivalent field, there will be a total of 103.3 acres of new surface disturbance resulting from the construction of service roads, main access roads, drill pads, local pipelines and gravel pits distributed as follows: 72 acres from construction of service roads and drill pads,. 14.5 acres from construction of a main access road, 1.8 acres for development of a local pipeline network to connect each producing well to the storage tank battery, and 15 acres for gravel pits for use in road and pipeline construction. A component breakdown of disturbance for the Bacon Flat Oil Filed Equivalent is listed on Table 4-4.

Assumptions for Pipelines

With the production of oil and gas there is the possibility of a pipeline being built between the oil fields and the Carlin Oil Terminal. The pipeline will be constructed in a cherry stem pattern with the main trunk of the pipeline running along Pine Valley .The main trunk of the pipeline will most likely be approximately 35 miles long. Approximately 30 miles of branch lines will connect the widely spaced producing wells to the trunk line. The construction of the trunk and branch pipeline would disturb 236 acres plus 62 additional acres of disturbance at the gravel source.

Assumptions for Oil Fields

Table 4-3 lists the number of wells that are projected to be drilled in the life of the plan. Two new small fields equivalent in size to the Kate Springs Field will be discovered during the life of the plan and each will include three producing wells. Two very small fields equivalent to the Bacon Flat Field will also be discovered and each of these will include one producing well. It is projected that for the Elko Resource Area during the life of the plan there will be an additional 8 producing wells discovered and 52 dry exploration holes (Table 4-4).

TABLE 4-3 PROJECTED OIL FIELDS

TYPE	PRODUCING WELLS	EXPLORATION WELLS
Two New Small Fields (Kate Springs Type)	6 wells	34 wells
Two Very Small Fields (Bacon Flat Type)	2 wells	18 wells
TOT AL	8 wells	52 wells

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The number of exploration wells may decrease if oil is discovered. In Railroad Valley, exploration dropped significantly to approximately two wildcat wells per year, after oil was found. For our scenario, exploration will maintain its current pace.

SUMMARY: Over the fifteen year projection, Geophysical Exploration will disturb 110 miles (182 acres), all of which will be reclaimed. Exploration drilling will result in 80 wildcat wells and access roads with a total of 600 acres of disturbance, 563 of which will be reclaimed. The discovery of the two projected small oil fields (Kate Springs equivalents) will result in 353.4 acres of surface disturbance. An additional 206.6 acres of disturbance will result from the discovery of the two very small oil fields (Bacon Flat equivalents). The construction of the cherry stem pipeline network in Pine Valley and the development of the associated gravel sources will result in 298 acres of additional surface disturbance.

There will be a total surface disturbance of 1360 acres through the remaining life of the plan. Through reclamation efforts during the life of the plan, a total of 744 acres will be reclaimed. This reclamation includes recontouring and revegetation of unsuccessful exploration well pads, the associated service roads, the underground pipelines and gravel sources. No reclamation is expected on the four new producing oil fields during the life of the plan. Surface disturbance from oil and gas activities will result in a net loss of 616 acres of vegetation during the fifteen year projection. Eventually all the acreage will be reclaimed and revegetated. The total surface disturbance associated with the RFDS for oil and gas exploration and development activities is summarized in table 4-4.

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TABLE 4-4 PROJECTED SURFACE DISTURBANCE CAUSED BY OIL AND GAS ACTIVITIES DURING THE LIFE OF PROJECTION

Geophysical				
miles	110			
acres/mi	1.65			
	Total	181.5	181.5	reclaimed
Exploration Drilling				
holes	80			
acres/hole	2	160		
roads	80			
acres/road	5.3	424		
gravel pits	80			
acres/pit	0.2	16		
	Total	600	37.5	
			562.5	reclaimed
Production				
Kate Springs Equivalent				
	Total	176.7		
Bacon Flat Equivalent				
	Total	103.3		
Pipeline to Carlin Oil Terminal				
miles	65			
acre/mile	3.63	235.95		
gravel pits	62			
acres/pit	1	62		
	Total	297.95		
	TOTAL	1359.45		
	Total Reclaimed		744	
	Unreclaimed		615.45	

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APPENDIX D
TYPICAL OIL AND GAS EXPLORATION AND DEVELOPMENT ACTIVITIES

TYPICAL OIL AND GAS EXPLORATION AND DEVELOPMENT PROCESS

INTRODUCTION

Typical oil and gas exploration and development operations occur in four phases, each of which in a predictable pattern that is contingent on the success or failure of the previous phase. The phases include: Exploration, Development, Production, and Abandonment. Leases are sometimes purchased after Preliminary Exploration but are most often obtained prior to the exploration phase.

EXPLORATION

Exploration includes all activities from the decision to explore for oil and gas resources to the discovery of economically viable oil and gas deposits. As easy-to-find oil and gas deposits have been discovered, increasingly complex and expensive technology is necessary to find those deposits which remain.

PRELIMINARY EXPLORATION

Oil and gas exploration is conducted in unexplored areas and geologic rock formations where commercial quantities of these resources are thought or known to be located. An area where commercial quantities of petroleum is thought to occur is classified as a frontier or rank wildcat area. In recent years with declining known oil and gas reserves, along with increasing price and an unstable world market, it has now become profitable to explore for oil and gas in less promising geologic provinces and in areas where climate, terrain, and depth of deposits has previously discouraged exploration efforts. Each year, new exploration and drilling technology along with improved transportation facilities have enhanced exploration efforts and improved prospects for locating, extracting and marketing oil and gas resources.

SURFACE EXPLORATION

Oil and gas can accumulate in geologic traps which include anticlines, faults, etc., and the surface exposure of these features would lead to the discovery of the trap. In the past, it was often possible to predict where oil and gas had accumulated by a thorough study of the surface exposure of the bedrock geology. Today, most of the oil and gas traps that could be found using simple surface exploration methods have already been found and exploited. There still remain a few examples of this type of trap and therefore these surface exploration techniques are still in use. These exploration methods may include preparation of geologic maps using field studies, aerial photos, and landsat imagery. Low level aircraft may also be used to gather additional data during reconnaissance flights over a target area. This would be followed by one or more geologists conducting field studies where the geologists would sample outcrops in the area and map the surface geology. This type of exploration is performed with little or no surface damage using four wheel drive vehicles, motorcycles, all terrain vehicles, or on foot.

GEOPHYSICAL EXPLORATION

As stated previously, most of the oil and gas traps that could be found using simple surface exploration techniques have already been found and exploited. Subsurface geology is not always accurately represented by the surface outcrop and in these cases the Exploration Geologist would

turn to geophysical methods to help locate oil and gas traps. Geophysical exploration can be done using a variety of instruments and processes but, all geophysical exploration is based on the measurement of one of the three subsurface characteristics which are: 1) Gravitational field, 2) magnetic field, 3) seismic reflection characteristics.

Gravitational and Magnetic

Gravitational and magnetic surveys involve the use of portable units which are easily transported using light ground vehicles or by light aircraft. Off-road vehicle travel is common in these two types of surveys and on some surveys there is minor surface disturbance when small hand dug holes are used for instrument placement along survey lines.

Surface Seismic Surveys

Reflection seismologic surveys are frequently employed by the Exploration Geologist because these surveys can provide the larges amount of subsurface data. This type of survey involves the collection of subsurface geological information by recording the impulses from an artificially generated shock wave. On land, this would begin with the creation of a shock wave and the recording, as a function of time, the reflected seismic energy as it arrives at the vibration detectors. The vibration detectors are on-haf to five pound seismometers which are placed on the ground at set intervals and are connected to a recorder truck that receives and records the reflected seismic energy.

The vibration detectors and shock wave generator would be located along lines on a one or two mile grid. Surveys may be laid out in excess of 40 miles in a series of grid patterns or in a single line. Seismic operations are conducted on existing roads where possible but, the clearing of vegetation and rocks may be required to improve access for seismic source and recording trucks. Completely clearing a seismic line of vegetation is unusual and most lines are not bladed except at drainage crossings. In some rough or sandy areas it may be necessary to use a bulldozer to pull the seismic trucks through the difficult spots.

In remote areas where there is little known subsurface data, a series of short seismic lines may be required to determine the characteristics of the subsurface formation. After this, seismic lines would be aligned to make seismic interpretations more accurate. Although alignment may be fairly critical, spacing of the lines can often be changed up to a quarter mile on a one mile grid before the results will affect the investigation program.

Seismic methods are usually classified by the various methods of generating the shock wave. These methods include: 1) Thumper, 2) Vibrator, 3) Spark Ignition, 4) Surface Explosive, 5) Subsurface Explosive.

The thumper method involves dropping a three ton steel slab to the ground many times in succession along a predetermined line.

The vibrator method is widely used and is replacing the explosive methods in areas where vehicle access is not difficult. An operation of this type would use three or four large vibrator trucks, four or five support vehicles, and a crew of ten to fifteen people. The four foot square vibrator pads are lowered to the ground and the vibrators on all trucks are then operated

electronically from the recording truck. After the reflections are recorded, the trucks move forward a short distance and the process is repeated.

The spark ignition method can be used with a variety of vehicles and consists of a bell shaped chamber mounted underneath the vehicle. The shock wave is generated by the spark ignition of a propane and oxygen mixture and is imparted to the ground through the bell shaped chamber. This method causes little surface damage.

The thumper, vibrator, and spark ignition methods all have surface disturbing factors in common. Generally, these methods involve the use of existing roads or cross-country travel by four or five energy source trucks (usually weighing twon and on-half to ten tons) plus the recording truck, cable trucks, or pickup trucks. Bulldozer assistance may be required to cross drainages or to traverse steep terrain. The vehicles may travel off road along a single trail made by the trucks as the survey progresses. The vehicles may make several parallel trails in an attempt to distribute travel loads over a broader area. Travel along the line is usually a matter of one to two passes by the vehicel since the energy source is mobile and recording is done as the vehicles move down the line.

Subsurface Seismic Surveys

Historically, both subsurface and surface explosive methods have been the most widely used process to generate shock waves. In the subsurface method, five to fifty pounds of explosive charge are detonated at the bottom of a twenty-five to two hundred foot deep drill hole. These drill holes are usually two to six inches in diameter and drilled with a truck mounted drill. Detonation of the charge in some areas causes no surface disturbance, while in other areas, a small crater up to six feet in diameter is created. The same hole may be reloaded and shot several times to find the depth and charge returning the best signal. Cuttings from the well are normally scattered by hand near the shot hole, or put back in the shot hole after detonation. Bentonite mud is often used to plug the shot hole after the survey is completed.

The trucks used while conducting explosive seismic methods are similar to the trucks used in thumper and vibrator methods except that the trucks used to transport the drill are much heavier (15 to 20 tons). As with other truck transportation operations, existing roads may be used or trails may be blazed by the drill or bulldozer. A truck mounted drill and shot operation generally takes longer to complete and requires more trips by drill service vehicles than do vibrator and thumper operations.

In areas where there are limitations, steep topography, or other restraints prevent use of truck-mounted drill rigs or recording trucks, light weight portable drill equipment can be used. Various kinds of portable drills can be backpacked or delivered by helicopter to the study area. These portable operations use a pattern of holes drilled to a depth of about 25 feet, the holes are then loaded with explosives and detonated simultaneously.

The surface explosive charge method involves the placing of explosives directly on ground, on snow, or on a variety of stakes and platforms including paper cones, survey stakes, lathes, or 2X4 wooden posts up to eight feet high. For this reason, surface explosive methods are very mobile and can be transported using 4X4 vehicles or adapted to airborne or ground pack teams.

A given area may be explored several times by the same or different companies over a long period of time using one or more of the geophysical methods mentioned above. This multiple exploration may be undertaken because the initial attempts were unsuccessful, another company wants its own information, or new and different techniques and/or equipment are used.

EXPLORATION DRILLING

Drilling does not begin until a lease has been acquired by the operator. When surface investigations are favorable and warrant further exploration, exploration drilling may be justified. Stratigraphic tests and wildcat tests are the two types of exploratory drill holes.

Stratigraphic tests involve drilling relatively shallow holes to supplement seismic data. These tests aid in revealing the nature of near surface structural features. The holes are usually from 100 to several thousand feet deep, and are drilled primarily by a high pressure airflow or circulating drilling mud. Samples of these chips are collected, bagged, and identified by depth and rock composition. The chips are studied by a geologist to determine age, rock type, and formation. Truck-mounted drilling equipment used for stratigraphic tests is mobile and therefore, minimal construction is necessary for access into sites on level and solid ground. In hilly or mountainous areas, more road building is necessary.

Access Roads

Generally, access roads are bladed 12 to 14 feet wide and are not crowned or ditched. Under certain conditions it may only be necessary to brush the access route to clear vegetation. Other roads may require road cuts in excess of 20 feet and fills of more than 10 feet. Stratigraphic tests that require large amounts of surface disturbance are unusual since construction costs may outweigh the value of the information gained.

Drilling

The average drill site requires an area of one-half acre or less surface disturbance in order to position the drill and support equipment. If high pressure air is used to circulate the rock chips, dust may be emitted to the air when samples are collected. If mud is used as a drilling fluid, mud pits may be dug but, it is more common to use portable mud tanks. Usually one to three days are required to drill the test holes, depending on depth to and hardness of the bedrock. In areas with shallow, high-pressure, water bearing zones, casing may be required to prevent water from entering the hole.

After the surface and subsurface geological studies, the seismic, and other geophysical surveys, comes the evaluation of the prospect. Only by drilling a wildcat well (a well drilled in unproved territory) will the oil company know if the rocks in the prospect they have identified contain oil or gas. Nationally, one in 16 wildcat wells produces significant amounts of oil or gas.

The deeper wildcat wells may require several months or more to complete; shallower wells up to a few thousand feet deep may be completed in as little as a few weeks. The deeper the test, the larger the drilling rig and the longer the drilling time required. Prior to approval of drilling, on-site inspections are conducted with the proposed drill pad and access road staked out, to assess potential impacts and attach appropriate mitigative conditions to the permit to drill. A drill pad

from one to four acres in size is then cleared of all vegetation, and leveled for the drill rig, mud pumps, mud (or reserve) pit, generators, pipe rack, and tool house. Topsoil and native vegetation is usually removed and stockpiled for use in the reclamation process. The mud pit may be lined with plastic or bentonite to prevent fluid loss or prevent contamination of water resources. Other facilities such as storage tanks for water and fuel are located on the pad or are positioned nearby on a separate cleared area. If the well site is not large enough for the equipment required to rig-up (prepare the drilling rig for operation), a separate staging area may be constructed. Staging areas are usually no larger than 200 feet by 200 feet and may only require a wide flat spot along the access road on which vehicles and equipment are parked.

Five thousand to 15,000 gallons of water per day may be needed for mixing drilling mud, cleaning equipment, cooling engines, etc. A surface pipeline may be laid to a stream or a water well, or the water may be trucked to the site from ponds or streams in the area.

The drill rigs are very large and may be moved in pieces. In some instances, rigs can be moved short distances on level terrain with little or no dismantling of equipment which will shorten the tearing-down and rigging-up time. Moving a dismantled rig involves use if heavy trucking equipment for transportation, and crews to erect the rig. Gross weight of vehicles may run in excess of 80,000 Ibs.

In order to move a drill rig and well service equipment from one site to another, and to allow access to each site, temporary roads may be built. These roads are generally 16 feet to 18 feet wide (driving surface) and may be as short as 200 feet or as long as ten miles or more. Bulldozers, graders and other types of heavy equipment are used to construct and maintain temporary wildcat roads.

The start of a well is called "spudding in" and, this procedure is started by forcing a short piece of tubing called conductor pipe into the ground and cementing it in place. This prevents surface sand and dirt from sloughing into the well hole. Next the regular drill bit and drill string (the column of drill pipe) are then used. These pass vertically through a heavy steel turn table (the rotary table), the derrick floor and the conductor pipe. The rotary table is geared to one or more engines, and rotates the drill string and bit. As the bit bores deeper into the earth, the drill string is lengthened by adding more pipe to the upper end.

Once the hole reaches a depth of several hundred feet, another string of pipe (the surface casing) is set inside the conductor pipe and cemented in place by pumping cement between the casing and the hole wall. Surface casing acts as a safety device to protect fresh water from drilling fluid contamination. Blowout preventors (large metal rams) are installed around the surface casing just below the derrick floor to prevent the well from "blowing out" in the event that the drill bit encounters a high pressure zone. In an emergency, these rams would be activated and the rams would close around the drill string and seal the well.

After setting the surface casing, drilling resumes using a smaller diameter bit. Depending on well conditions, additional strings of casings (intermediate casing) may be installed before the well reaches the total depth. During drilling, a mixture of water, clay and chemical additives known as "mud" are continuously pumped down the drill pipe. The mud exits through holes in the bit and

returns to the surface outside the drill-pipe. As the mud circulates, it cleans and cools the bit and carries the rock chips (cuttings) to the surface. It also helps to seal off the sides of the hole (thus preventing cave-ins), and to control the pressure of any water, gas or oil encountered by the drill bit.

The mud is the first line of defense against a blow-out since it is used to control pressure. It is for this reason that a pit full of "reserve" mud (the reserve pit) is maintained on location. The reserve mud is used in emergencies to restore the proper drilling environment when radical or unexpected changes in down-hole pressure is encountered.

Testing

The cuttings are separated from the mud and sampled so that geologists can analyze the various strata through which the bit is passing. The remainder of the cuttings pass into the reserve pit as waste. Some holes are drilled at least partially with compressed air which serves the same purpose as drilling mud of cooling and cleaning the bit and circulating the cuttings out of the hole.

During completion of drilling activity, the well is logged. This entails the use of geophysical instruments to measure the physical characteristics of the rock formations and associated fluids through which the borehole passed. These instruments are lowered to the bottom of the well, and slowly raised to the surface while recording data. Other measuring procedures include the drill stem test, in which pressures are recorded and fluid samples taken from zones of interest. After studying the data from those logs and tests, the geologist and/or petroleum engineer decide if the well will produce petroleum.

Plugging and Abandonment

If the well did not encounter oil and gas, it is plugged with cement and abandoned. The well pad and access road are recontoured and revegetated.

If the well will produce, casing is run to the producing zone and cemented in place. A proper cementing of the production casing string is required to provide coverage and prevent interzonal communication between oil and gas horizons and usable water zones. The drill is usually replaced bya smaller rig that is used for the final phase of completing the well.

DEVELOPMENT

If a wildcat well becomes a discovery well (a well that yields commercial quantities of oil or gas), development wells will be drilled to confirm the discovery, to establish the extent of the field, and to efficiently drain the reservoir. The procedure for drilling development wells are about the same as for wildcats, except there is usually less subsurface sampling, testing, and evaluation. If formation pressure can raise oil to the surface, the well will be completed as a flowing well. Several down-hole acid or fracture treatments to enhance the formation permeability may be necessary to make the well flow. A free-flowing well is simply closed off with an assembly of valves, pipes, and fittings (called a christmas tree) to control the flow of oil and gas to other production facilities. A gas well may be flared for a short period to measure the amount of gas per day the well can produce, then shut in or connected to a gas pipeline.

If the well is not free-flowing, it will be necessary to use pump methods. After the pump is installed, the well may be tested for days or months to see if it is economically justifiable to produce the well and to drill additional development wells, During this phase, more detailed seismic work may be run to assist in precisely locating the petroleum reservoir and to improve previous seismic work.

FIELD DEVELOPMENT

As with wildcat wells, field development well locations will be surveyed. A well spacing pattern must be established by the state (usually the wells can be spaced no closer than 330 feet from the quarter-quarter lines). Under special conditions, this spacing can be varied somewhat. Oil well spacing for production from federal leases uses units of 160, 320, and 640 acres per well. Spacing for both oil and gas wells is based on the characteristics of the producing zones. If oil or gas is producing from more than one formation, the surface location of the wells may be closer than one per 40 acres. Once well spacing has been approved, development of the lease proceeds.

During the development stage, the road system of the area is greatly expanded. Once it is known which wells produce and the expected length of their productive life, a system of permanent roads can be designed and built. Because it often takes several years to develop a field and determine field boundaries, the permanent road system is usually built in segments. For this reason, many temporary roads (built initially for wildcats or development) end up as long term (in excess of 15 years) main access or haul roads. The planning of temporary roads for wildcats and development wells is done with road conversion to long term in mind.

Since development wells have longer life spans than wildcat wells, access roads for development wells are better planned, designed and constructed. Access roads are normally limited to one main route to serve the lease areas, with a maintained side road to each well. Upgrading of temporary roads may include ditching, draining, installing culverts, graveling, crowning, or capping the roadbed. The amount of surface area needed for roads would be similar to that for temporary roads mentioned earlier and would also be dependent on topography and loads to be transported over it. Generally, main access roads are 20 feet to 24 feet wide and side roads are 14 feet to 18 feet wide. These dimensions are for the driving surface of the road and not the maximum surface disturbance associated with ditches, cuts or fills. The difference in disturbance is simply a matter of topography. Surface disturbance in excess of 130 feet is not unusual in steep terrain (slopes exceeding 30 percent).

When an oil field is developed on the current minimum spacing pattern of 40 acres per well, the wells are 1320 feet apart in both north-south and east-west directions. If a one square mile section is developed with 16 wells, at least four miles of access roads may be increased since steep slopes, deep canyons, and unstable soil areas must often be circumvented in order to construct stable access to the wells. Surface use in a gas field may be similar to an oil field (though usually less) even though the spacing of wells is usually 1600 acres. Though a 160 acre spacing requires only four wells per section, the associated pipeline system often has similar initial surface requirements (acreage of surface disturbance).

FACILITY DEVELOPMENT

Tank Batteries and Well Siting

In addition to roads, other surface uses required for development drilling may include flowlines, storage tank batteries; facilities to separate oil, gas and water (separators and treaters); and injection wells for salt water disposal. Some of the facilities may be installed at each producing well site, and others at places situated to serve several wells. Surface use in an oil and gas field may be affected by unitization of the leaseholds. In many areas with federal lands, an exploratory unit is formed before a wildcat is drilled. The boundary of the unit is based on geologic data. The developers unitize the field by entering into an agreement to develop and generate it as a unit, without regard to separate ownerships. Costs and benefits are allocated according to agreed terms.

Unitization reduces the surface-use requirements because all wells are operated as though on a single lease. Duplication of field processing facilities is minimized because development operations are planned and conducted by a single unit operator, often resulting in fewer wells.

The rate of development well drilling depends on whether the field is operated on an individual lease basis or unitized, the probability of profitable production, the availability of drilling equipment, protective drilling requirements (drilling requirements to protect federal land from subsurface petroleum drainage byoff-setting nonfederal wells), and the degree to which limits of the field are known. The most important development rate factor may be the quality of production. If the discovery well has a high rate of production and substantial reserves, development drilling usually proceeds at a fairly rapid pace. If there is some question whether reserves are sufficient to warrant additional wells, development drilling may occur at a much slower pace. An evaluation period to observe production performance may follow between the drilling of successive wells.

Development on an individual lease basis usually proceeds more rapidly than under unitization, since each lessee must drill his own well to obtain production from the field. On a unitized basis, however, all owners within the participating area share in a well's production regardless of upon whose lease the well is developed. Spacing requirements are not applicable to unit wells. The unit is developed on whatever the operator considers to be the optimal spacing pattern to maximize recovery. As mentioned earlier, drilling in an undeveloped part of a lease to prevent drainage of petroleum to an offset well on a adjoining lease (protective drilling) is frequently required in fields of intermingled federal and privately owned land. The terms of federal leases require such drilling if the offset well is on non-federal lands, or on federal lands leased at a lower royalty rate.

Many fields go through several development phases. A field may be considered fully developed and produce for several years, then a well may be drilled to a deeper pay zone. Discovery of a new pay zone in an existing field is a "pool" discovery, as distinguished from a new field discovery. A pool discovery may lead to the drilling of additional wells with the bore holes separated only by feet or inches. Existing wells may also be drilled deeper.

Transporting Production

Usually four to six inch diameter pipelines transport the petroleum between the well, the treating and separating facilities, and central collection points. These lines can be on the surface, buried, or elevated. Most pipelines are buried.

Trucking and pipeline are the two methods used separately or in conjunction to transport oil out of a lease or unitized area. Trucking is used to transport crude oil from small fields where installation of pipelines is not economical and the natural gas in the field is not economically marketable. It is not practical to truck natural gas.

Pipelines are the most common way to transport oil and gas. If a field has substantial amounts of natural gas, separate pipelines will be necessary for oil and gas. Pipelines move the oil from gathering stations to refineries. As existing fields increase production or new fields begin production, new pipelines may be needed. These new lines usually vary in size from four to 16 inches in diameter, and range in length from a few miles (to tie into an existing pipeline), to hundreds of miles to supply a refinery. Construction of a pipeline requires excavating and hauling equipment, a temporary and/or permanent road, possibly pumping stations, clearing the right-of-way of vegetation and possibly blasting.

Natural gas pipelines transport gas from the wells (gathering or flow lines) to a trunk line then to the main transmission line from the area. Flow lines are usually two inches to four inches in diameter and mayor may not be buried. Trunk lines are generally six inches to eight inches in diameter and are buried, as are transmission lines which vary in diameter from ten inches to 36 inches. The area required to construct a pipeline varies from about 15 inches wide (for a two inch to four inch surface line) to greater than 75 feet for the larger diameter transmission lines (24 inches to 36 inches). Surface disturbance is primarily dependent on size of the line and topography of the area on which the line is being constructed.

Compressor stations may be necessary to increase production pressure to the same level as pipeline pressure. The stations vary in size from approximately one acre to as much as twenty acres for a very large compressor system. Construction techniques for natural gas lines are similar to those used for oil pipelines.

PRODUCTION

INITIAL METHODS

Production in an oil field begins just after the discovery well is completed and is usually concurrent with development operations. Temporary facilities may be used at first, but as development proceeds and reservoir limits are determined, permanent facilities are installed. The extent of such facilities are dictated by the number of producing wells, expected production, volume of gas and water produced with the oil, the number of leases, and whether the field is to be developed on a unitized basis.

The primary means of removing oil from a well is by the use of pumping jacks. The pumps are powered by electric motors (power lines required) or if there is sufficient casing head gas

(natural gas produced with the pumped oil), or another gas source is available, it may be used to fuel internal combustion engines.

Some wells may produce sufficient water that must be disposed of during operation of the well. Although most produced waters are brackish to highly saline, some are fresh enough for beneficial use. If water is to be discharged, it must meet certain water quality standards. Because water may not come from the treating and separating facilities completely free of oil, oil skimmer pits may be established between separating facilities and surface discharge.

When salt water is disposed of underground, it is always introduced into a formation containing water of equal or poorer quality .It may be injected into the producing zone from which it came or into other producing zones. In some cases, it could reduce the field productivity and may be prohibited by state regulation or mutual agreement of operators. In some fields, dry holes or depleted producing wells are used for salt water disposal, but occasionally new wells are drilled for disposal purposes. Cement is squeezed between the casing and sides of the well to prevent the salt water from migrating up or down from the injection zone into other formations.

Underground oil is under pressure in practically all reservoirs. This pressure is usually transmitted to the oil through gas or water in the reservoirs with the oil. When oil is pumped out of the well, pressure is reduced in the reservoir around the drill hole. This allows the gas or water in the reservoir to push more oil into the space next to the well. A reservoir that has mostly gas pushing the oil is called "gas drive", and one that has mostly water pushing the oil is called "water drive". Oil that is recovered under these natural pressures is considered primary production. Primary production accounts for about 25 percent of the oil in a reservoir.

INCREASING RECOVERY

Methods of increasing recovery from reservoirs generally involve pumping additional water or gas into the reservoir to maintain or increase the reservoir pressure. This process is called secondary recovery. Recently, the trend has been to institute secondary recovery processes very early in the development of a field. Surface disturbance from a water flooding recovery system is similar to drilling and development of an oil and gas well itself, i.e., a drill pad and access road are constructed and water pipelines may be built. Surface use is increased substantially since as many as four injection wells may be used for each oil well in the field (there are many different patterns as well as many other methods of secondary recovery).

Tertiary recovery methods increase recovery rates by lowering the viscosity of the oil either by heating it or by injecting chemicals into the reservoir so that the oil flows more easily. Heating of reservoir oil can be accomplished by injecting steam into the reservoir. Tertiary recovery methods are not yet widely used in this Elko Resource Area. By the year 2000, ultimate recovery (including secondary and tertiary recovery) from any given oil reservoir is expected to average 40 percent nationally.

POST PUMPING TREATMENT

Crude oil is usually transferred from the wells to tank storage facilities (tank battery) before it is transported from the lease. If it contains gas and water, they are separated before the oil is stored

in the tank battery .The treating and separating facilities are usually located at a storage tank battery on or near the well site.

After the oil, gas, and water are separated, the oil is piped to storage tanks located on or near the lease. There are normally at least two tanks; so that one tank can be filling as the contents of the other is measured, sold, and transported. The number and size of tanks vary with the rate of production on the lease, and with the extent of automation in gauging the volume and sampling the quality of the tank's contents.

ABANDONMENT

The life span of fields varies because of the unique characteristics, the nature of the petroleum, subsurface geology, and political, economic, and environmental constraints. All affect a field's life span from discovery to abandonment. The life of a typical field is 15 to 25 years. Abandonment of individual wells may start early in a field's life and reach a maximum when the field is depleted.

Well plugging and abandonment requirements vary with the rock formations, subsurface water, well-site, and the well. In all cases, the formations bearing useable-quality water, oil,gas or geothermal resources, and/or prospectively valuable deposits of minerals will be protected. Generally, in dry wells, the hole below the casing is filled with heavy drilling mud, a cement plug is installed at the bottom of the casing, the casing is filled with heavy drilling mud, and a cement cap is installed on top. A pipe monument giving the location, lease number , operator, and name of the well is required unless waived by the Authorized Officer. If waived, the casing may be cut off and capped below ground level. Protection of aquifers and known oil and gas producing formations may require placement of additional cement plugs.

In some cases, wells that formerly produced are plugged as soon as they are depleted. In other cases, depleted wells are not plugged immediately but are allowed to stand idle for possible later use in a secondary recovery program. Truck-mounted equipment is used to plug former producing wells. In addition to the measures required for a dry hole, plugging of a depleted producing well requires a cement plug in the perforated section in 1he producing zone. If the casing is salvaged, a cement plug is put across the casing stub. The cement pumpjack foundations are removed or buried below ground level. Surface flow and injection lines are removed, but buried pipelines are usually left in place and plugged at intervals as a safety measure.

After plugging, the drilling rig is removed and the surface, including the reserve mud pit, and the well pad area is restored to the requirements of the surface management agency. This may involve the use of bulldozers and graders to recontour those disturbed areas associated with the drill pad plus the access road to the particular pad. The reserve pit (the part of the mud pit in which a reserve supply of drilling fluid and/or water is stored) must be evaporated or pumped dry, and filled with soil material stockpiled where the site was prepared. There is little leakage if the pit was lined with plastic or bentonite. The area is reshaped to a useful layout that will allow revegetation to take place, the landform is restored as near as possible to its original contour, and erosion minimized. After grading the subsoil and spreading of the stockpiled topsoil, the site is

seeded with a grass mixture that will establish a good growth. A fence may be erected to protect the site until revegetation is complete, particularly in livestock concentration areas.