CHAPTER 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

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3.1 Introduction

This chapter describes the natural, cultural, and social environment of public lands in the 3 Bars Project area that would be affected by the alternatives under consideration. These descriptions are followed by an examination of how vegetation treatment and other activities may affect these natural, cultural, and social resources. The focus of the analysis is on the alternative proposals for treating public lands within the 3 Bars ecosystem. The analysis is useful in understanding the consequences of the proposed action and alternatives.

Supplemental authorities that are subject to requirements specified by statute or executive order must be considered in all BLM environmental documents. The 17 elements associated with the supplemental authorities listed in the BLM Instruction Memorandum NV-2009-030 (USDOI BLM 2009c) are listed in **Table 3-1**. The table lists the elements and their status in the project area as well as the rationale to determine whether an element present in the project area would be affected by the proposed action or any of the alternatives. Supplemental authorities that may be affected by the proposed action or any of the alternatives are discussed in this chapter under each element. Those elements listed under the supplemental authorities that do not occur in the project area and would not be affected are not discussed further in this EIS. The elimination of nonrelevant issues follows CEQ policy, as stated at 40 CFR § 1500.4.

In addition to the elements listed under supplemental authorities, the BLM considers other resources and uses that occur on public lands and the issues that may result from the implementation of the proposed action or any of the alternatives. Other resources or uses of the human environment that have been considered for this EIS are listed in **Table 3-2**.

3.2 How the Effects of the Alternatives Were Evaluated

Within each resource area, applicable direct and indirect effects are evaluated. Cumulative effects, unavoidable adverse commitments, and resource commitments that are lost or cannot be reversed are also evaluated for all treatment activities in the EIS. These impacts are defined as follows:

- Direct effects – Those effects that are caused by the action and occur at the same time and in the same general location as the action.
- Indirect effects – Those effects that occur at a different time or in a different location than the action to which the effects are related.
- Cumulative effects – Those effects on the environment that result from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

TABLE 3-1

Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action and other Alternatives

Supplemental Authority Element (*Authority*)	Not Present	Present/Not Affected	Present/May be Affected	Reference Section
Air Quality			●	3.5
Areas of Critical Environmental Concern			●	3.21
Cultural Resources			●	3.22
Environmental Justice		●		3.24
Farm Lands (Prime and Unique)		●		3.11
Fish Habitat			●	3.14
Floodplains			●	3.10
Forests and Rangelands (Healthy Forest Restoration Act only)			●	3.11
Human Health and Safety			●	3.25
Migratory Birds			●	3.15
Native American Religious Concerns			●	3.23
Threatened or Endangered Species			●	3.11, 3.14, 3.15
Wastes (Hazardous and Solid)	●			
Water Quality			●	3.9
Wetlands and Riparian Zones			●	3.10
Wild and Scenic Rivers	●			
Wilderness	●			

- Unavoidable adverse commitments – Those effects that could occur as a result of implementing any of the action alternatives. Some of these effects would be short term, while others would be long term.
- Irreversible commitments – Those commitments that cannot be reversed, except perhaps in the extreme long term. This term applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity, that are renewable only over long periods of time.
- Irretrievable commitments – Those commitments that are lost for a period of time. For example, timber production is lost while an area is mined. The production lost is irretrievable, but the action is not irreversible. If the site is reclaimed, it is possible to resume timber production.

This chapter should be read together with Chapter 1 (Purpose and Need), which explains why the BLM is proposing to conduct treatments, and Chapter 2 (Alternatives), which explains the alternative proposals the BLM is considering to restore the health and functionality of the 3 Bars ecosystem. The analyses of the affected environment and

environmental consequences in this chapter build upon and relate to information presented in these earlier chapters to identify which resources may be impacted and how and where impacts might occur.

3.2.1 Direct and Indirect Effects

To the extent practicable, existing environmental analyses were used in analyzing impacts associated with the proposed action and alternatives. Within each resource area, applicable direct and indirect effects are evaluated. Key factors considered in the analysis included treatment methods and their risks, acreage treated, effectiveness of SOPs, and mitigation measures.

This EIS focuses on treatments that the Mount Lewis Field Office proposes to conduct during the life of the project. For analysis purposes, however, it was assumed that projects would occur within a 10 to 15 year period. It is expected that similar types of treatments would occur after this period that would still be covered by the analysis in this EIS. The analysis in this EIS builds upon analyses in earlier EISs, Environmental Assessments, and environmental reports, including the 17-States PEIS and PER, *Mount Hope Project Final Environmental Impact Statement* (Mount Hope Project EIS), and AECC (USDOI BLM 2007b, c, 2009a, 2012c).

TABLE 3-2

Resources or Uses other than the Elements Associated with Supplemental Authorities and Rationale for Detailed Analysis for the Proposed Action and Other Alternatives

Resources or Uses	Present/Not Affected	Present/May be Affected	Reference Section
Forest/Woodland Products		●	3.11
Geology and Minerals		●	3.6
Historic Trails		●	3, 20, 3.21, 3.22
Land Use and Access		●	3.19
Noxious Weeds and other Invasive Non-native Vegetation		●	3.12
Paleontology		●	3.7
Recreation		●	3.20
Socioeconomic Values		●	3.24
Soil Resources		●	3.8
Transportation	●		
Vegetation		●	3.11, 3.12
Visual Resources		●	3.18
Water Resources		●	3.9
Wilderness Study Areas		●	3.21
Wild Horses		●	3.16
Wildlife		●	3.15

Information from the 17-States PER was used to assess the effects on the environment of using non-herbicide treatment methods, including fire use, and mechanical, manual, and biological control methods, to treat hazardous fuels, invasive species, and other unwanted or competing vegetation (USDOI BLM 2007c). Risk is defined as the likelihood that an effect (injury, disease, death, or environmental damage) may result from a specific set of circumstances (USDOI BLM 2007b).

3.2.2 Cumulative Effects

The NEPA and its implementing guidelines require an assessment of the proposed project and other projects that have occurred in the past, are occurring in the present, or are likely to occur in the future, which together may have cumulative impacts that go beyond the impacts of the proposed project itself. According to 40 CFR §§1508.7 and 1508.25[a][2]):

> "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In addition, to determine the scope of Environmental Impact Statements, agencies shall consider cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement."

The purpose of the cumulative effects analysis is to determine if the effects of BLM vegetation treatments have the potential to interact or accumulate over time and space, either through repetition or when combined with other effects, and under what circumstances and to what degree they might accumulate.

3.2.2.1 Structure of the Cumulative Effects Analysis

For this EIS, the analysis of cumulative impacts is a four-step process that follows guidance provided in *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997):

- Specify the class of actions for which effects are to be analyzed.
- Designate the appropriate time and space domain in which the relevant actions occur.
- Identify and characterize the set of receptors to be assessed.
- Determine the magnitude of effects on the receptors and whether those effects are accumulating.

3.2.2.2 Class of Actions to be Analyzed

This analysis addresses site-specific and local-scale trends and issues that require integrated management across landscapes. It also addresses trends and changes in the social and economic needs of people. Restoration treatment methods used by the BLM are considered in the analysis. These include manual, mechanical, and biological control methods, and the use of fire, as identified in Chapter 2 (Alternatives).

For this EIS, potential cumulative effects include those that were assessed for all land ownerships, including lands administered by other federal agencies and non-federal lands, particularly effects to air quality, aquatic and terrestrial species, and subsistence resources. The analysis and disclosure of cumulative effects alerts decision-makers and the

public to the context within which effects are occurring, and to the environmental implications of the interactions of known and likely management activities.

3.2.2.3 Appropriate Temporal and Spatial Domain

3.2.2.3.1 Temporal Domain

The analysis period covered by the cumulative effects analysis begins in 2014 and continues through 2039. The timeline outlined in this EIS (about 10 to 15 years) is based on when treatments would occur and to realize the results of the treatments over time in terms of meeting management objectives and desired vegetative conditions (about 10 years). The timeline is also based on the difficulty of predicting advances in technology, approved treatment practices, and the types and amounts of vegetation treatments needed, very far into the future. Thus, a reasonable analysis period, and one on which most of the cumulative effects analysis is focused, is 25 years into the future. In accordance with CEQ guidance on June 24, 2005 (CEQ 2005), past actions associated with the 3 Bars ecosystem are addressed through their current aggregate effects and have not been provided as a list of individual projects. A brief discussion of past and present actions in the vicinity of the 3 Bars Project area is provided in Section 3.2.2.3.3; a more detailed discussion can be found in Section 4.3 of the Mount Hope Project EIS (USDOI BLM 2012c).

3.2.2.3.2 Spatial Domain

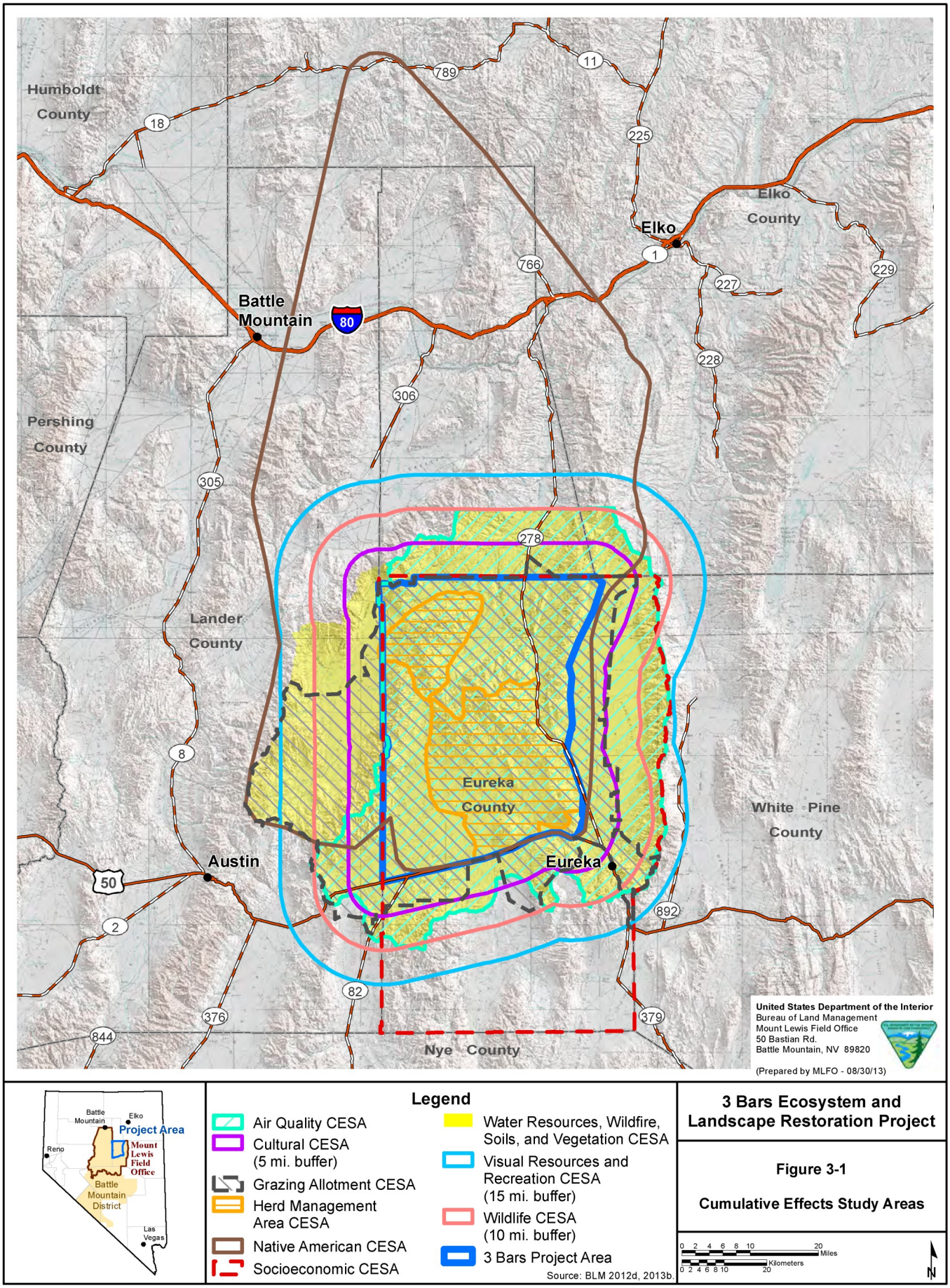
For some resources and uses, the project area may be where the effect can be felt (known as the “footprint”), but for others, the footprint may extend well beyond that space. For example, air quality effects to humans can extend miles beyond the footprint of the proposed action. The spatial domain, or cumulative effects study area (CESA), for past, present, and reasonably foreseeable future activities for each resource is identified under the discussion of the analysis area for each resource, and is shown in **Figure 3-1**. The rationale used to develop the spatial domain is also provided under the descriptions of the resources that follow.

For the purposes of this analysis, non-federal lands include lands owned and/or managed by individuals, corporations, Native American tribes, states, counties, or other agencies. The BLM does not have the authority to regulate any activities or their timing on lands other than those the BLM administers. However, when an action takes place on public land, it may cause direct or indirect effects on non-federal lands. For example, a wildfire that begins on public land may burn to adjacent private land, or noxious weeds and other invasive non-native vegetation infestations that begin on public land may infest adjacent private land.

This EIS also considers the likely effects on public lands from reasonably foreseeable actions occurring on non-federal land. For example, agricultural use of non-federal land may potentially have direct impacts on terrestrial wildlife species that move between federal and non-federal lands during the year or during their life cycle. The role of the management of non-federal lands was considered in the analysis on these species and their associated ecosystems. Localized actions on non-federal lands often affect local environmental conditions on nearby federal land and may also affect federal management decisions.

3.2.2.3.3 Past, Present, and Reasonably Foreseeable Future Actions

Numerous past and present actions on and near the 3 Bars Project area have contributed to existing conditions on the 3 Bars Project area. These include actions by entities with an interest in vegetation management, including nearby federal land management agencies, the State of Nevada, Eureka County and other local governments, and private landowners including ranchers and farmers, and private development. Past and present actions considered in the



3 Bars Ecosystem and Landscape Restoration Project

Figure 3-1

Cumulative Effects Study Areas

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cumulative effects analysis include noxious weeds and other invasive non-native vegetation treatments and the use of herbicides; grazing, agriculture, and the use and harvest of woodland products; utility infrastructure and distribution networks; wildfires, fuels management, and reseeding; habitat stabilization and rehabilitation; livestock and wild horse management activities; recreation; land development; mineral development and exploration; and oil, gas, and geothermal leasing and development.

In addition, the BLM identified reasonably foreseeable future actions that could affect conditions on the 3 Bars Project area and that should be addressed in the cumulative effects analysis. These projects and activities have the potential to impact the environmental resources of concern within all or portions of the various CESAs. The following summarizes past, present, and reasonably foreseeable future actions that have or will occur in one or more of the 3 Bars Project CESAs.

Grazing and Grazing Management, Range Improvement, and Allotment Management

Past land uses on lands in the CESA and throughout the western U.S. have resulted in changes in the vegetation community from its historic ecological site characteristics. Much of the land degradation that has occurred within the 3 Bars ecosystem has been attributed to historic livestock grazing, including land disturbance that has led to the establishment and spread of noxious weeds and other invasive non-native vegetation, and expansion of pinyon-juniper woodland beyond its historical ranges (USDOI BLM 2009a). Livestock often congregate near streams, springs, and wetlands and have contributed to the loss of riparian habitat and forage, and degradation of stream channels and their ability to function properly and provide abundant and high quality water for livestock. Humans have also been a major factor in influencing vegetation distribution, including human actions that have altered fire regimes and caused the spread of noxious weeds and other invasive non-native vegetation.

Livestock grazing has been, and continues to be, a dominant land use in Eureka County and the adjoining portions of Elko, Lander, White Pine, and Nye Counties. Multiple grazing allotments have been permitted and administered by the BLM during the past half century. The carrying capacity of these allotments has been adjusted over the years in response to mineral development, drought, wildfires, availability of stock water, and rangeland condition.

Surface water sources that support livestock grazing and agriculture within the CESAs include reservoirs, perennial creeks, springs, and seeps. Improved water sources include developed springs, stock wells, stock ponds, water pipelines, and troughs. Livestock will generally congregate near these features. Cow-calf pairs, heifers, steers, bulls, and sheep graze on residual forage in alfalfa fields, irrigated pastures, and rangeland within Eureka County and the adjoining portions of Elko, Lander, White Pine, and Nye Counties. In addition, a substantial amount of four-strand (three barbed and one smooth wire on the bottom) wire fencing has been constructed within the CESAs. Past and present range and habitat improvement projects have resulted in changes to vegetation communities. The actual acreage for this has not been quantified, however, some of these projects are range improvements that include fences, cattleguards, noxious weeds and other invasive non-native vegetation control, water troughs, spring improvements, wells, reservoirs, windmills and tanks, and pipelines.

Open range livestock operations are expected to continue on public lands within the CESA at management levels that have been established through allotment-specific grazing decisions. Fenced feeding operations occur on fenced private lands within the CESAs and are expected to continue as well (**Figure 3-2**). Short-term (typically 2 to 4 years) temporary suspensions to Animal Unit Months (AUMs) would be expected in response to prescribed fires and the resultant temporary loss of forage, to allow for vegetation establishment and stabilization. The permittee(s) can choose whether to run fewer animals or run animals for less time in response to temporary suspensions of AUMs. The

BLM will continue to monitor resource conditions and utilization levels to determine if changes in the current terms and conditions of the grazing permit will be required to ensure the long-term success of rangeland treatments. Any changes to the permitted use would be completed through the issuance of subsequent grazing decisions in accordance with 43 CFR §§ 4110.3, 4130.3-3, and 4160.

Range improvement projects are also proposed as part of ongoing livestock management programs at the BLM Mount Lewis Field Office and could include:

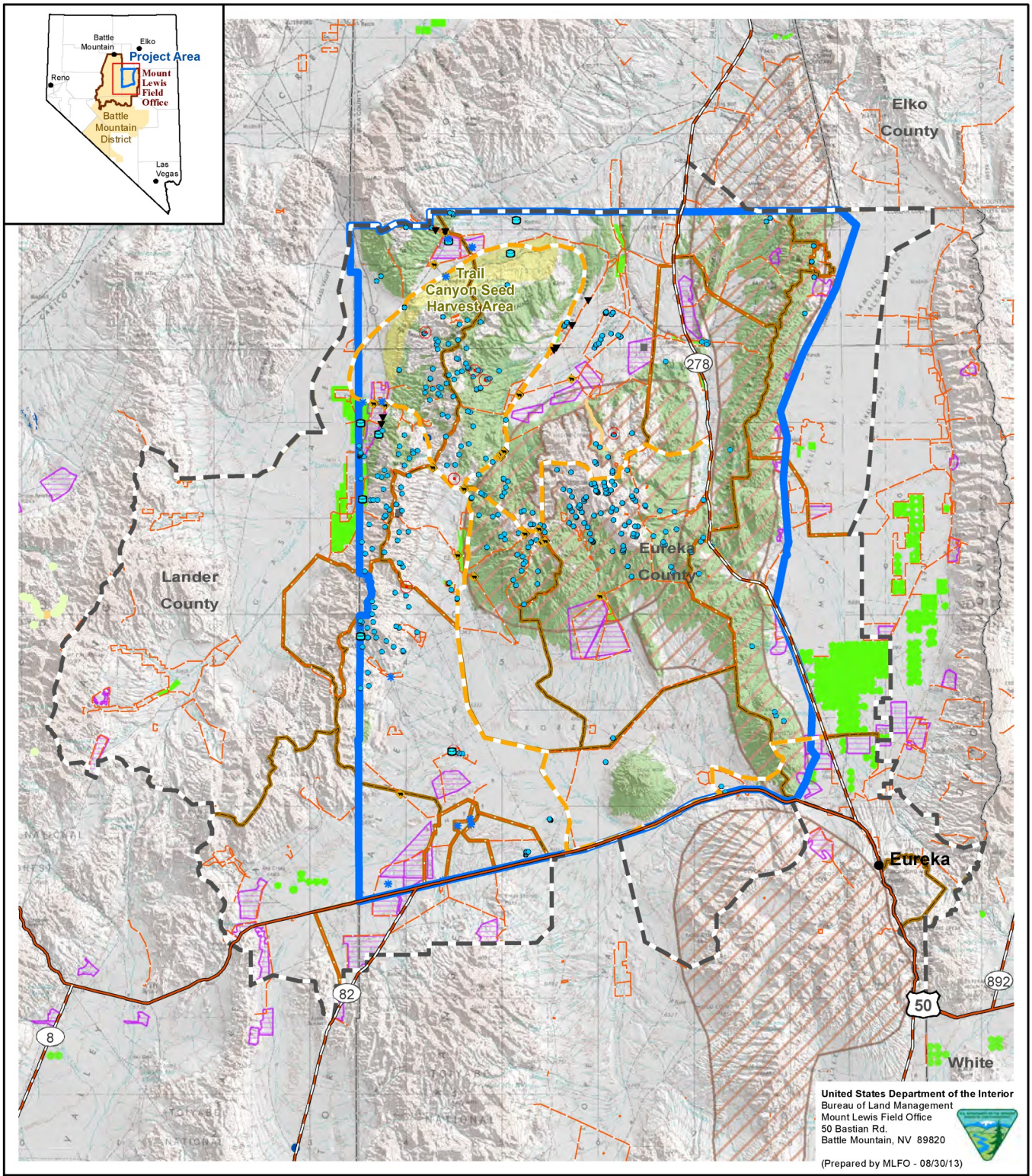
- allotment/pasture fences, exclosure fences, and drift fence construction
- seeding and seeding maintenance
- vegetation manipulation
- noxious weeds and other invasive non-native vegetation population control
- fence relocation
- water hauls
- maintenance of wells and troughs
- spring developments

In order to ensure long-term success, restoration projects would not be conducted in areas with moderate to severe forage utilization until mitigation measures associated with grazing management, as discussed in Section 3.17.4, are implemented. This would occur through agreements or decisions subsequent to the 3 Bars Project Record of Decision to ensure proper utilization levels during the appropriate season of use. The BLM would work with permittees on a permit-by-permit basis to address any changes in livestock management due to treatment implementation. In all instances, appropriate changes in livestock management through agreements or decisions would be finalized prior to project implementation.

The BLM would also manage livestock to meet greater sage-grouse habitat objectives. These objectives include having a sagebrush cover of greater than 20 percent, and total shrub cover of greater than 40 percent for nesting cover; ensuring that at least five plant species used by greater sage-grouse broods are present in brood-rearing areas; ensuring that sagebrush canopy cover equals or exceeds 10 percent, and sagebrush height equals or exceeds 25 centimeters in the winter use area; and ensuring that allowable use levels for livestock for herbaceous species are less than or equal to 45 percent in mountain big sagebrush, and 35 percent in Wyoming big and black sagebrush stands, and less than or equal to 35 percent for all sagebrush types for utilization of shrub species (USDOI BLM 2013g).

Noxious Weeds and other Invasive Non-native Vegetation

Noxious weeds and other invasive non-native vegetation are found within the 3 Bars Project area and adjacent lands (**Figure 3-2**). The BLM uses an integrated vegetation management approach to prevent, control, or contain noxious weeds and other invasive non-native vegetation, using, but not limited to, manual, mechanical, biological, fire, and chemical methods. In an integrated vegetation management program, each management option is considered and/or used in combination with another, recognizing that no one management option is a stand-alone option and that each has its strengths and weaknesses. No individual method will eradicate undesirable vegetation in a single treatment; multiple treatments may be required. The effects of these treatment methods were analyzed for 17 western states, including Nevada, in the 17-States PEIS and PER (USDOI BLM 2007b, c).



Legend

Range Improvements
- Cattle Guard
- Corral
- Gate
- Reservoir
- Spring
- Stock Tank/Trough/Waterhaul
- Windmill/Well
- Other Water Development
- Fence

Noxious Weed Treatments
- Canada thistle
- Musk thistle
- Perennial pepperweed
- Russian knapweed
- Scotch thistle
- Tamarisk
- Whitetop/Hoary cress
- Allotment Boundaries
- Irrigated Cropland

- Range Improvement Treatment
- Commercial Pine Nut Sale Area
- Private Fuelwood and Christmas Tree Harvest Area
- Seed Harvest Area
- Grazing Allotment CESA
- Herd Management Area CESA
- 3 Bars Project Area

Source: USGS 2004; AECOM 2011a; BLM 2012d,e, 2013b,c,d,e.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-2

Cumulative Impacts from Grazing, Agriculture, and Forest Product Activities

0 1 2 3 4 5 10 Miles
0 1 2 3 4 5 10 Kilometers
N

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The BLM treated about 250 acres of noxious weeds and other invasive non-native vegetation on the 3 Bars Project area during 2011 using herbicides. Key species targeted for treatments included cheatgrass, hoary cress, musk and Scotch thistles, and Russian knapweed. Treatments within the CESAs are also conducted by the Diamond Valley Weed Control District and private landowners. The BLM and other landowners within the CESA would continue noxious weeds and other invasive non-native vegetation inventory, treatment, and monitoring within the vegetation CESAs.

Historically, the BLM has used ground-based methods, including hand-held sprayers, truck mounted sprayers, and all-terrain vehicles to control local occurrences of noxious weeds and other invasive non-native vegetation as authorized by the *Environmental Assessment Integrated Weed Management Plan Battle Mountain District Nevada Mt. Lewis Field Office and Tonopah Field Office* (USDOI BLM 2009b). The BLM can also use herbicides on areas burned by wildfires under Burned Area Emergency Stabilization and Rehabilitation authorizations. Most treatments in the future would also be conducted using ground-based methods.

The BLM is authorized to use the 18 herbicide active ingredients authorized in the 17-States PEIS. Pesticide Use Proposals have been developed by the Battle Mountain District BLM for 11 herbicides—2,4-D, clopyralid, chlorsulfuron, dicamba, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, tebuthiuron, and triclopyr.

In 2011, only five herbicide active ingredients were used on the 3 Bars Project area—2,4-D, glyphosate, imazapyr, metsulfuron methyl, and picloram. Imazapyr was used as a stand-alone herbicide, while 2,4-D was tank mixed with metsulfuron methyl and with picloram, and glyphosate and metsulfuron methyl were tank mixed together. About 80 percent of treatments involved the use of 2,4-D in a tank mix with metsulfuron methyl. Specific herbicide characteristics and approved use areas are discussed in the 17-State PEIS (USDOI BLM 2007b:2-9 to 2-16).

The BLM has applied herbicides aerially in the past to treat noxious weeds and other invasive non-native vegetation, and may use helicopters or fixed-wing aircraft to apply herbicides in the future. Should aerial spraying occur in the future, the BLM anticipates only using 2,4-D, glyphosate, imazapic, imazapyr, and metsulfuron methyl, all of which are labeled for this specific application method. Operation of helicopters is more expensive than operation of fixed-wing aircraft, but helicopters are more maneuverable and more effective in areas with irregular terrain. Helicopters are also more effective for treating targeted vegetation in areas with multiple vegetation types.

Ground-based herbicide treatments would continue as the primary treatment method in riparian areas, while aerial herbicide applications would primarily occur in larger, more expansive areas to treat cheatgrass. However, treatments could occur anywhere in the CESA where Nevada-listed noxious weeds and other invasive non-native vegetation are found.

Irrigated Crops and Irrigation Facilities on Private Lands

Approximately 24,357 acres are under irrigation in Diamond Valley, and 280 acres were under irrigation in Kobeh Valley in 2011. Agricultural development in Pine Valley was approximately 5,100 acres in 2007 (USDOI BLM 2012c).

Irrigation facilities and irrigation of crops are only permitted on private lands, with the exception of ditches that require a right-of-way. Continued agricultural activities in Diamond Valley, Kobeh Valley, and Pine Valley are reasonably expected to occur in the form of flood and pivot irrigation (USDOI BLM 2012c). Irrigated croplands near the 3 Bars Project area are shown on **Figure 3-2**.

Woodland Products

Private fuelwood, Christmas tree, and pine nut harvest areas are found within the CESAs (**Figure 3-2**). Commercial pine nut harvesting occurs under permits issued by the Mount Lewis Field Office. Yearly commercial pine nut harvesting is very sporadic, based on the tree production of cones and nuts. Other woodland product harvesting activities include the commercial and personal cutting of pinyon pine and Utah juniper for firewood, the personal cutting of pinyon pine for Christmas trees, the greenwood cutting of primarily juniper for fence posts, and commercial and personal harvesting of pine nuts (USDOI BLM 2012c).

Personal use of woodland products would occur in the future in the CESAs. Public and tribal pine nut and woodland products harvesting would continue based on the trees' production of cones and nuts. Commercial firewood and pine nut harvesting could occur in the Sulphur Spring Range, Roberts Mountains, and Whistler Mountains in the 3 Bars Project area, and in the Fish Creek Range in Eureka County.

Wild Horse Management Activities

Wild horse gathers to achieve the Appropriate Management Level (AML) were conducted in the Roberts Mountain Herd Management Area (HMA) in 1987, 1995, 2001, and 2008. Drought-stressed wild horses were gathered from the Whistler Mountain HMA in 2001, in conjunction with the Roberts Mountain gather. The Whistler Mountain HMA was gathered with the Roberts Mountain HMA in 2008. The Kobeh Valley area outside the Fish Creek HMA was gathered in 1994 and 2008. The Rocky Hills HMA was gathered in 1997, 1999, 2009, and 2010, and fertility control was implemented during the last two gathers.

The objective of BLM wild horse gathers has been to remove wild horses from outside of designated HMA boundaries, achieve and maintain the established AMLs, and in recent years, treat and/or re-treat mares for fertility control to reduce population growth rates. During gathers, the BLM does not remove all wild horses within an HMA. Either a portion of the population remains uncaptured or the BLM selects wild horses to release back to the range. This helps to achieve the low range of the AML and allows the population to increase for about 3 to 4 years before another gather would be required. To date, approximately 1,200 wild horses have been removed from the Roberts Mountain Complex, which includes the Roberts Mountain, Whistler Mountain, and Fish Creek North HMAs, and 650 wild horses from the Rocky Hills HMA.

Future wild horse management activities within these HMAs could include AML reviews and adjustments, adjustments to HMA boundaries, fence removal, enhancement of existing water sources and development of new water sources, and implementation of range improvement projects. Methods used to control wild horse populations would primarily involve gathers to remove excess animals to control populations, and fertility control through injections of immunocontraceptives. These activities would help to maintain herd numbers near sustainable levels and to distribute wild horses more evenly across the rangeland. The BLM is also guided by the Nevada Northeastern Great Basin Resource Advisory Council to promote healthy rangelands through implementation of standards and guidelines for maintaining healthy wild horse herds on HMAs.

Fuels Management and Habitat Improvement Projects

The BLM is conducting ongoing, previously authorized, fuels treatments on approximately 17,378 acres in the CESA. These include: Eureka-South Diamond Valley Wildland Urban Interface Treatments (2,087 total acres, 247 acres still to be treated; USDOI BLM 2003a, 2006); Red Hills (3,671 total acres, 859 acres still to be treated; USDOI BLM 2005a); Sulphur Spring Hazardous Fuels Reduction Treatments (8,620 total acres, 6,420 acres still to be treated;

USDOI BLM 2009d); Tonkin (1,000 total acres, 650 acres still to be treated; USDOI BLM 2005b); and Roberts Mountains Habitat Enhancement Project (2,000 total acres, 500 still to be treated; USDOI BLM 2007d). Of the 8,676 acres still to be treated, about 8,021 acres would be treated using manual and mechanical methods, and 655 acres would be treated using prescribed fire. In addition, the BLM would seed or plant many of the acres after treatment to restore native vegetation, and would continue to monitor past treatments, and treat as necessary, to mitigate any noxious weeds and other invasive non-native vegetation that may establish in treatment areas and ensure that treatments meet established goals.

In addition to these projects, the BLM would continue to conduct projects to slow the spread of noxious weeds and other invasive non-native vegetation, and restore lands degraded by wildfire, which are allowed under previously approved authorizations. If the No Action Alternative (Alternative D) is selected, it is likely that the BLM would authorize additional treatments within the 3 Bars ecosystem to meet the goals in the Shoshone-Eureka RMP, including hazardous fuels reduction, stream restoration, and fish and wildlife habitat improvement projects. These projects may be similar to those proposed under the action alternatives, but under Alternative D, these projects would have to be analyzed individually under separate NEPA analyses. These projects would likely be similar to those described in the previous paragraph, but would be smaller in size and would take longer to implement than would be the case for treatments under the action alternatives. It is estimated that the BLM would conduct about 1,500 acres of treatments annually under current and future authorizations under the No Action Alternative, not including treatments that would be conducted as part of rehabilitation of lands burned by wildfires.

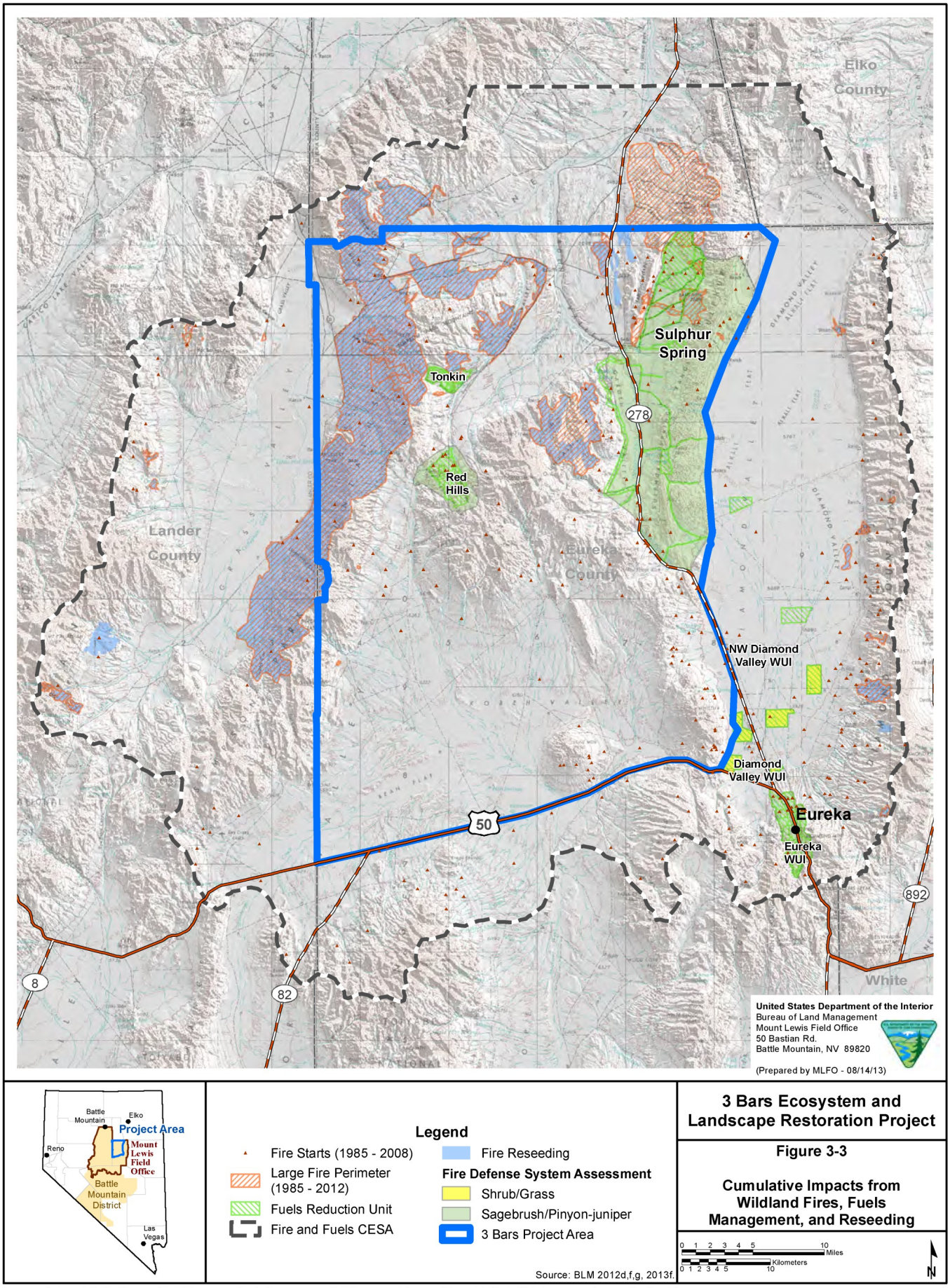
While the acreage burned by wildfires in a given year is sporadic and highly variable, since 1985 wildfires have burned an average of 4,200 acres annually within the 3 Bars Project area and an average of 6,900 acres annually within watersheds that are wholly or partially within the CESAs, and several large fires have occurred within the CESA since 1985 (**Figure 3-3**). The BLM and local fire districts would continue to conduct fire suppression activities when wildfires occur within the CESAs. The scale and scope of those activities would be proportional to the size of the wildfire and its proximity to structures.

Recreation

Dispersed recreation opportunities include sightseeing, pleasure driving, rock collecting, photography, winter sports, off-highway vehicle use, mountain biking, picnicking, camping, fishing, hunting, hiking, and Pony Express Trail re-rides. This wide range of opportunities is possible because virtually all of the public lands in the CESAs are accessible to the public and offer a variety of settings suitable for different recreational activities. Numerous roads provide access to off-highway vehicle users within the CESA (**Figure 3-4**). Recreational use within the CESA is likely to increase proportionally to changes in population, with dispersed outdoor recreational activities being the predominant type of recreation.

Utilities and Infrastructure

Past utility and distribution actions include the development of roads, powerlines, and telecommunications, as well as public water supply and wastewater systems. Roads have been developed by the federal government and the State of Nevada (U.S. Highway 50, State Route 278, and State Route 892), Eureka County and adjoining counties, the BLM, and the Forest Service. The town of Eureka is in southeastern Eureka County. Individual ranches and farms comprise the remainder of the inhabited areas in southern Eureka County and the surrounding counties of Lander, Nye, White Pine, and Elko.



3 Bars Ecosystem and Landscape Restoration Project

Figure 3-3

Cumulative Impacts from Wildland Fires, Fuels Management, and Reseeding

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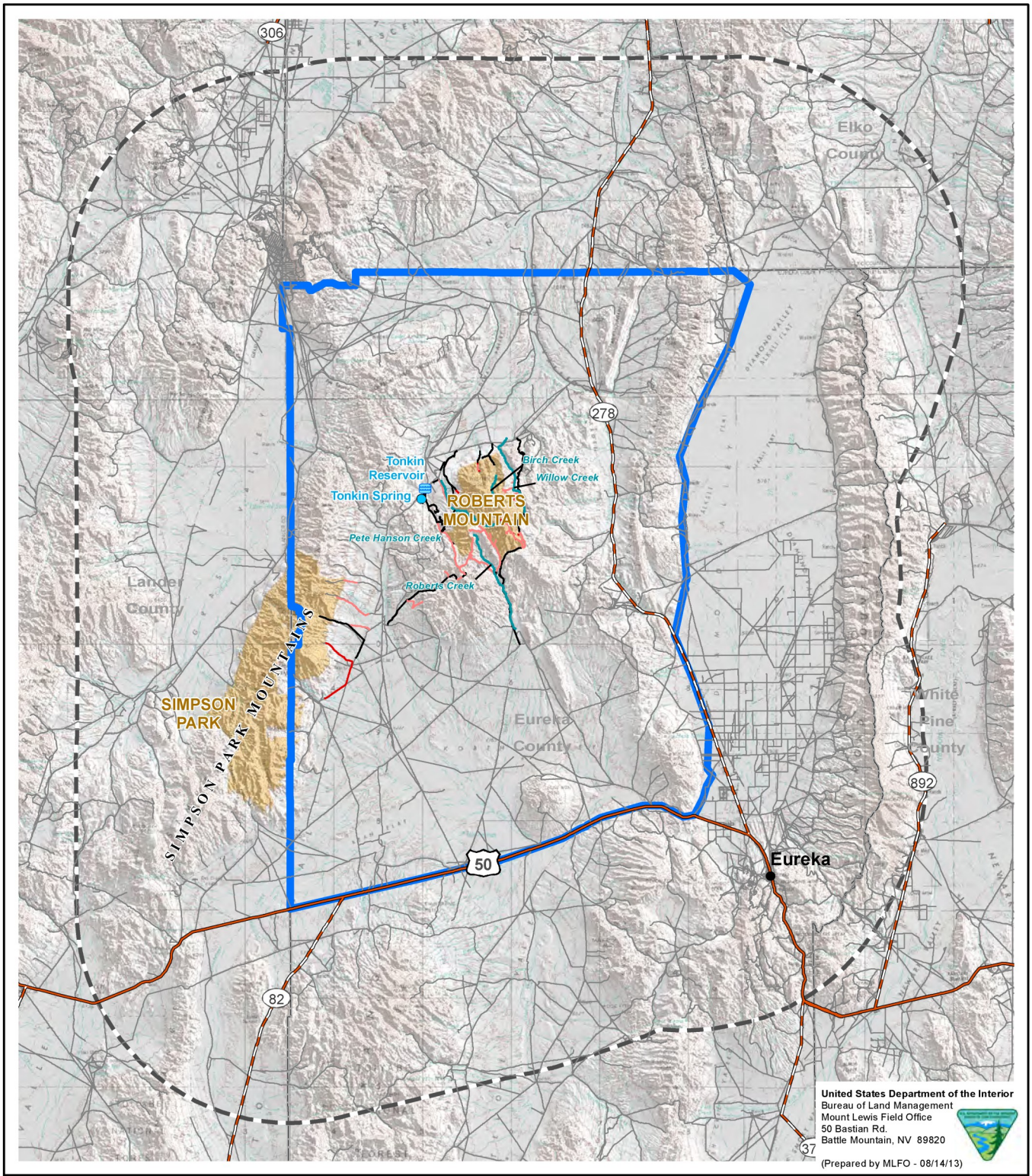

Legend

Travel Route Accessible to:
- All Vehicles
- High Clearance Vehicles
- 4 Wheel Drive Vehicles
- All-terrain Vehicles (ATV)

- Spring
- Reservoir
- Fishing Stream
- Wilderness Study Area
- Visual and Recreation CESA
- 3 Bars Project Area

Source: U.S. Census 2009, 2010a,b, 2011da BLM 2012d,g; USGS 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-4

Cumulative Impacts from Recreation and Wilderness

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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Three general types of roads have been developed within Eureka County and the adjoining counties—paved roads, gravel surface roads, and dirt roads. There are two major travel routes within the CESAs—U.S. Highway 50 and State Route 278.

Development of additional roads is probable; however, most of these roads may be unauthorized dirt roads created during motorized recreational use of public lands in the CESAs, and paved or unpaved roads associated with development in or near the town of Eureka. It is reasonable to expect that traffic would increase in volume on the two major travel routes (U.S. Highway 50 and State Route 278) in the CESAs, as well as on the other county roads in proportion to an expected increase in economic activity and population growth, although no estimate was made on the miles of new roads and railroads and acres of disturbance in the reasonably foreseeable future (**Figure 3-5**).

Two major transmission powerlines are in Eureka County, distributing power in the State of Nevada as part of the power grid. One is the Falcon-Gonder line that travels from north of Beowawe, Nevada, through the project area to U.S. Highway 50 and then east to Ely, Nevada. The other main transmission line is an east-west line that parallels U.S. Highway 50. In addition, there are power distribution lines in Diamond Valley and the town of Eureka and to most of the remote ranches and mining operations within the CESA boundaries.

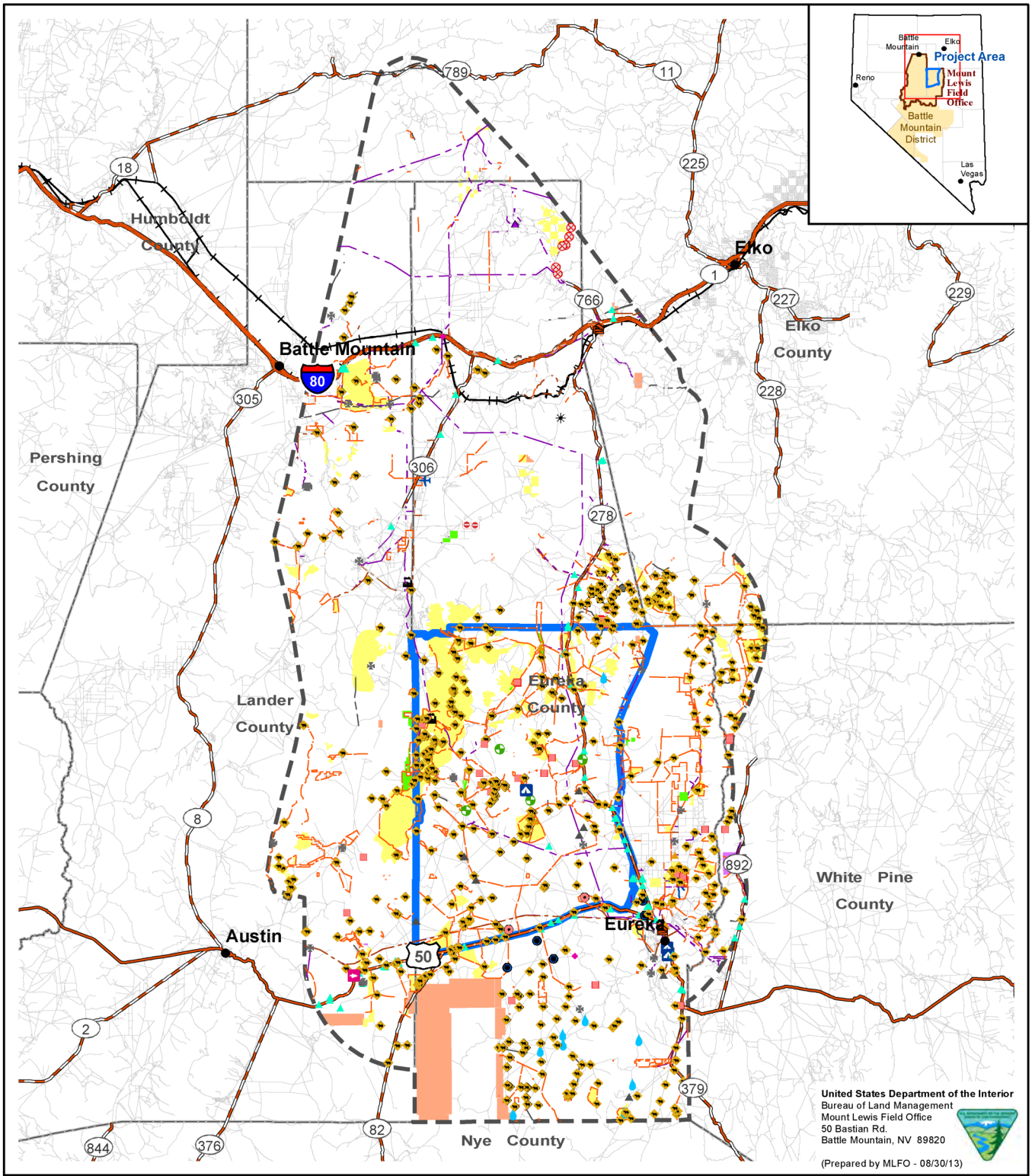
The town of Eureka and the Devils Gate General Improvement District in Diamond Valley have a community water supply system, which is supplied primarily from ground water wells in Diamond Valley, as well as springs in the Pinto Summit area (USDOI BLM 2012c).

The town of Eureka is planning to expand beyond its current limits of development and will require additional infrastructure to support the needs of the community. The need for new transmission lines within this portion of the Nevada is not anticipated, however, as existing rights-of ways can accommodate additional transmission line development and it is reasonable to expect that additional utility distribution and telephone lines would be constructed.

Mineral Development and Exploration

There are ten historic mining districts that occur within the geology and minerals CESA in Eureka County—Alpha, Antelope, Diamond, Eureka, Fish Creek, Lone Mountain, Mineral Hill, Mount Hope, Roberts, and Union. The Alpha District is in the Sulphur Spring Range. The Antelope District is on the western flank of Roberts Mountains. The Diamond District is north of the town of Eureka on the west flank of the Diamond Mountains. The Eureka District, is in the vicinity of the town of Eureka. The Fish Creek District is southwest of the town of Eureka in the Fish Creek Range. The Lone Mountain District is on the north flank of Lone Mountain in Kobeh Valley. The Mineral Hill District is on the northwest flank of the Sulphur Spring Range. The Mount Hope District is on the southeast flank of Mount Hope and is where the Mount Hope Project is being constructed. The Roberts District is on the west flank of the Simpson Park Mountains. The Union District is on the north flank of the Sulphur Spring Range. Surface disturbance associated with these operations has not been quantified, however, the value is likely in the range of several hundreds to a few thousand acres.

From the mid-1960s to the present, mineral resource development within the CESA has principally been gold production from four mining operations: Gold Bar, Windfall, Tonkin Springs, and Ruby Hill. The Gold Bar Mine is found in the Antelope District in the southern Roberts Mountains and closed in the 1990s. The Ruby Hill mine is active and is in the Eureka District. The Windfall-Rustler and Lookout Mountain (Ratto Canyon) mines are in



Legend

- CESA Maximum Extent
- Agriculture
- Airport
- Communication Site
- Drill Pad
- Dump
- Exclusion Area
- Fire Station
- Historical Site
- Material Site
- Monitoring Site
- Monument
- Non-Energy Facility
- Power Facilities
- Pump Station
- Range Improvement
- Recreation Site
- Right of Way
- Stream Gaging Station
- Study Plot
- Trespass
- Water Pumping Plant
- Well
- Undefined
- Railroad
- Interstate Hwy
- U.S. Hwy
- State Hwy
- Other Road
- Fence
- Irrigation Facilities
- Pipeline
- Telephone Line
- Transmission Line
- Irrigated Crop
- Land Exchange
- Land Treatment Area
- Lease
- 3 Bars Project Area

Source: U.S. Census 2009, 2010a,b, 2011a; BLM 2012c,d.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-5

Cumulative Impacts from Utilities and Infrastructure

0 2 4 6 8 10 20 Miles

0 2 4 6 8 10 20 Kilometers

N

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the southern portion of the Eureka District and exploration is ongoing. The Tonkin Springs Mine is currently in closure.

Activities associated with mining, exploration, and extraction would continue to occur in the CESA and would be likely to occur in the 3 Bars Project area (**Figure 3-6**). There are no active mines within the 3 Bars Project area, although the 8,318 acre Mount Hope Project, which is within the 3 Bars Project boundary, is under construction and is scheduled to begin operations in mid- to late 2015. McEwen Mining recently purchased the Gold Bar facilities from U.S. Gold Corporation and is conducting baseline work in anticipation of reinitiating mining on the property. Exploration is also occurring in the Red Hills area and at the north end of Rocky Hills. Gibellini vanadium mine, south of the town of Eureka, has submitted a Plan of Operations to the BLM and preparation of an EIS has begun. There are about 385 acres of sand and gravel materials sites within the Mining Operations and Geothermal, Oil, and Gas CESA. Of these, about 55 acres are within the 3 Bars Project area.

Oil, Gas, and Geothermal Leasing and Development

There are oil and gas leases throughout the CESAs (**Figure 3-6**). Four oil fields have been developed in Pine Valley. These oil fields are in Eureka County and are administered by the BLM Elko District.

There are two geothermal projects within the Mining Operations and Geothermal, Oil, and Gas CESA. The McGinness Hills geothermal project is in Grass Valley, Lander County, and is west of the 3 Bars Project area. The Beowawe geothermal project is in Whirlwind Valley, northern Eureka County, and is north of the 3 Bars Project area. Both projects are in operation. As energy demands increase and advancements in exploration and drilling technology lead to development of previously unexplored resources, oil, natural gas, and geothermal leasing and exploration are likely to increase. Increased economic incentive may also lead to an increase in exploration and development as oil prices rise, although no exploration or development permit applications for projects in the CESAs have recently been submitted to the BLM. There would be additional disturbance associated with oil and gas and geothermal exploration and development as projects are proposed.

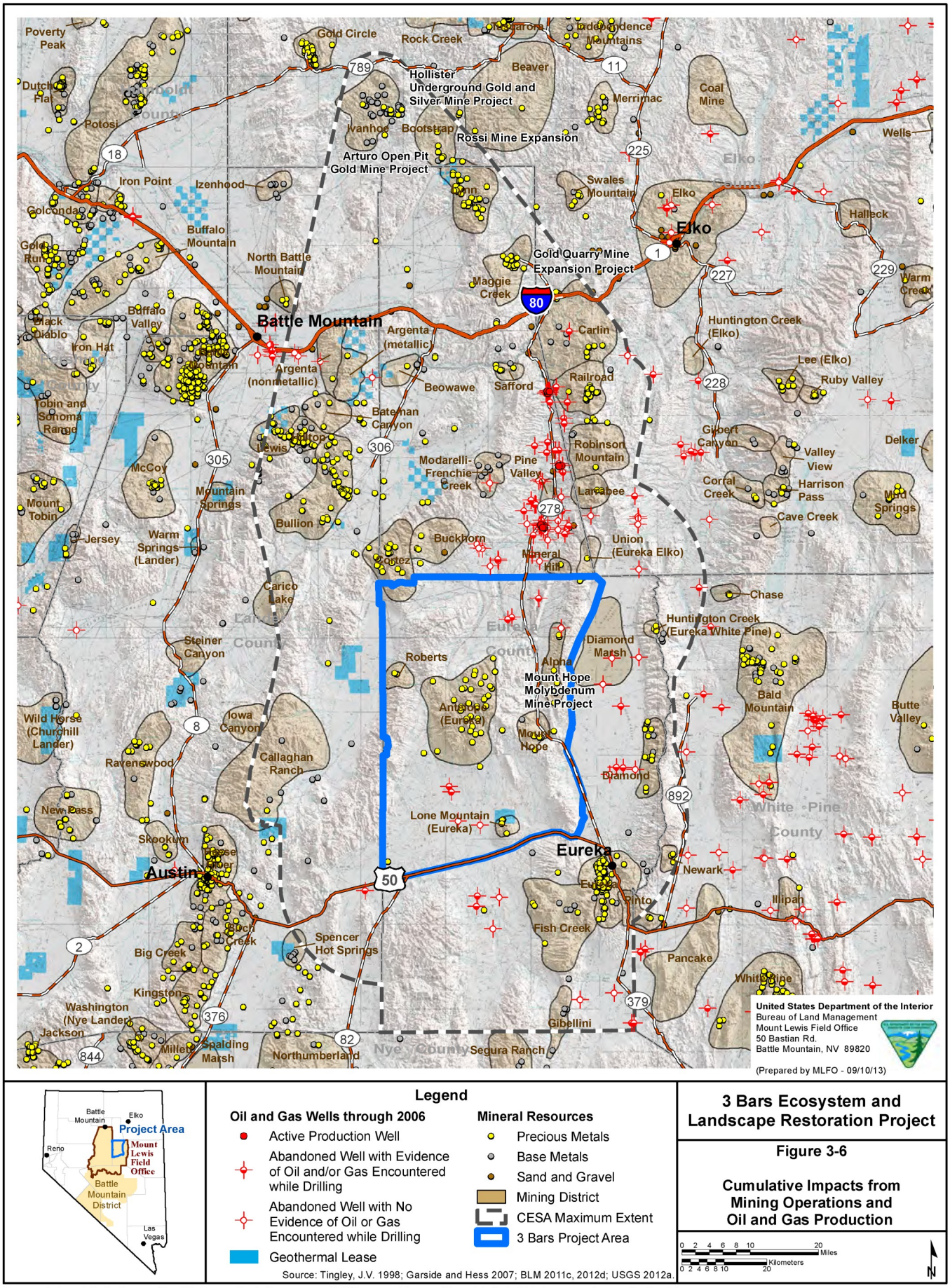
All future proposed actions within the CESAs would be analyzed when a lessee submits plans for the action. The BLM would have the ability to limit discretionary activities on public lands, such as oil, natural gas, and geothermal leasing, because of the potential for listing of the greater sage-grouse as threatened or endangered under the Endangered Species Act, and possibility that leasing actions could adversely impact greater sage-grouse.

Land Development

The town of Eureka comprises approximately 880 acres. The majority of the town area lies along U.S. Highway 50. In addition, approximately 700 acres have been identified for residential or commercial development in the Diamond Valley area. The town of Eureka and the Diamond Valley community consist of roads, residences, commercial and public buildings, powerlines, fences, and other related development.

There has been little industrial activity within the CESAs except for mineral development activities discussed above. There are also cement batch plants in the town of Eureka and Diamond Valley (USDOI BLM 2012c).

Approximately 23,000 acres within Diamond Valley and within the project area have been identified for disposal in the Shoshone-Eureka RMP. Public land sales are considered possible under reasonably foreseeable future actions. The BLM is evaluating a proposed 150-acre land sale associated with the Ruby Hill Mine. Other potential land sales could include lands associated with community development or specific resource development projects. Any future land



Legend

Oil and Gas Wells through 2006

- Active Production Well
- Abandoned Well with Evidence of Oil and/or Gas Encountered while Drilling
- Abandoned Well with No Evidence of Oil or Gas Encountered while Drilling
- Geothermal Lease

Mineral Resources

- Precious Metals
- Base Metals
- Sand and Gravel
- Mining District
- CESA Maximum Extent
- 3 Bars Project Area

Source: Tingley, J.V. 1998; Garside and Hess 2007; BLM 2011c, 2012d; USGS 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-6

Cumulative Impacts from Mining Operations and Oil and Gas Production

0 2 4 6 8 10 20 Miles

0 2 4 6 8 10 20 Kilometers

N

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sales that were not within disposal areas identified in the Shoshone-Eureka RMP would be subject to congressional requirements in the implementing legislation. Public lands converted to private ownership would be subject to all applicable state environmental laws.

If a land sale involved community development land, there would likely be a future change in use from wildlife habitat to residential or commercial development. If a land sale involved an ongoing resource development project, current resource activities would likely continue into the future with possible expansion. After the resource activity has been completed, the land could be restored to uses such as livestock grazing and wildlife habitat, which would be the use if the land remained under BLM management, or could be converted to other uses. Long-term use of privatized land would be subject to any covenants agreed to at the time of sale. Information on areas identified for disposal can be found in the 1986 *Shoshone-Eureka Resource Area ROD* (USDOI BLM 1986a:5) on the BLM Battle Mountain District Office website at URL: http://www.blm.gov/nv/st/en/fo/battle_mountain_field/blm_programs/planning/resource_management.html.

3.2.2.4 Set of Receptors to be Assessed

The set of receptors assessed in the cumulative effects analysis are the natural, cultural, and social resources discussed in this chapter.

3.2.2.5 Magnitude of Effects and whether Those Effects are Accumulating

The potential extent of the total cumulative effects (e.g., number of animals and habitat affected), and how long the effects might last (e.g., population recovery time) are estimated to determine the magnitude of effects that could accumulate for each resource. Where possible, the assessment of effects on a resource is based on quantitative analysis (e.g., acres affected by treatment activity). However, many effects are difficult to quantify (e.g., animal behaviors; human perceptions) and a qualitative assessment of effects is made.

As suggested by the CEQ, this EIS considers the following basic types of effects that might occur:

- Additive – total loss of sensitive resources from more than one incident.
- Countervailing – negative effects are compensated for by beneficial effects.
- Synergistic – total effect is greater than the sum of the effects taken independently.

The cumulative effects analysis assumes that maintenance of past treatments has occurred, and that the BLM would make an investment in maintaining the condition achieved or the objectives of the project, rather than implementing stand-alone, one-time treatments. The analysis also assumes that the BLM would determine the need for the action based on past monitoring, and that additional monitoring would occur after the project to ascertain if effects are still accumulating or if the treatment has been effective in achieving the resource objective.

3.2.3 Unavoidable Adverse Commitments

Unavoidable adverse commitments are those commitments that could occur as a result of implementing any of the action alternatives. Some of these effects would be short term, while others would be long term.

3.2.4 Irreversible and Irretrievable Commitments

Irreversible commitments are those commitments that cannot be reversed, except perhaps in the extreme long term. This term applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to factors, such as soil productivity, that are renewable only over long periods of time.

Irretrievable commitments are those commitments that are lost for a period of time. For example, timber production is lost while an area is mined. The production lost is irretrievable, but the action is not irreversible. If the site is reclaimed, it is possible to resume timber production.

3.2.5 Resource Protection Measures Considered in the Effects Analysis

The impacts assessment assumes that SOPs, monitoring measures, and mitigation developed by the BLM for the alternatives would be adopted to protect environmental and socioeconomic resources on public lands (**Appendix C**).

In addition, a number of federal, state, local, and tribal resource management and monitoring programs have been established to protect environmental resources and, in cases where there is existing environmental impairment, to effect restoration. The assessment of cumulative impacts recognizes the existence of these programs and assumes that the mandate under which each program was established will continue. The effects analysis assumes that these programs effectively avoid or mitigate the environmental impacts that they are designed to address. The programs are discussed in the sections that follow.

3.2.6 Incomplete and Unavailable Information

This EIS discusses the baseline environment that exists today, and impacts from treatments that the Mount Lewis Field Office proposes to conduct during life of the project. It is assumed that baseline conditions would change little during the expected life of this EIS (about 10 to 15 years). Still, treatments could occur during the life of this EIS that are substantially different from those evaluated in this EIS. If so, the Mount Lewis Field Office would conduct additional NEPA analysis to assess those projects' effects.

The analysis of impacts of the treatments in this EIS is based on the best and most recent information available. As is always the case when developing management direction for a wide range of resources, not all information that might be desired is available. The CEQ regulations provide direction on how to proceed with the preparation of an EIS when information is incomplete or unavailable:

> "If the information relevant to reasonably foreseeable significant adverse impacts cannot be obtained because the overall costs of obtaining it are exorbitant or the means to obtain it are not known, the agency shall include within the environmental impact statement: 1) a statement that such information is incomplete or unavailable; 2) a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable significant adverse impacts on the human environment; 3) a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment; and 4) the agency's evaluation of such impacts based upon theoretical approaches or research methods generally accepted in the scientific community. For the purposes of this section, "reasonably foreseeable" includes "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by

> credible scientific evidence, is not based on pure conjecture, and is within the rule of reason" (40 CFR § 1502.22 b).

For this EIS, the primary effect of unavailable information is the inability to quantify certain impacts. Where quantification was not possible, impacts have been described in qualitative terms. A summary of existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable adverse impacts on the human and socioeconomic environment and supports the BLM's evaluation of such impacts has been included in Chapter 3, in the appendices that accompany this EIS, and in supporting documents that were prepared for this EIS.

There are also uncertainties associated with the assessment process used to determine the effects from the use of the treatment methods. Our knowledge of risks to the environment from treatment methods continually evolves. Our knowledge is, and always will be, incomplete regarding many aspects of terrestrial and aquatic species; ecology of the lands administered by the BLM; the economy; society; the types of vegetative threats the Field Office will face in future years; funding; and changes in government policy. To reduce the level of uncertainty, the best available information was used, and it was assumed that future treatment actions, funding, and government policies, as they apply to BLM-administered lands, would be similar to actions and policies that have occurred in recent years. Should these conditions change and as the best available science emerges such that assumptions made in this EIS are no longer valid, the Mount Lewis Field Office would conduct additional NEPA analysis to better understand risks from their treatments.

3.3 General Setting

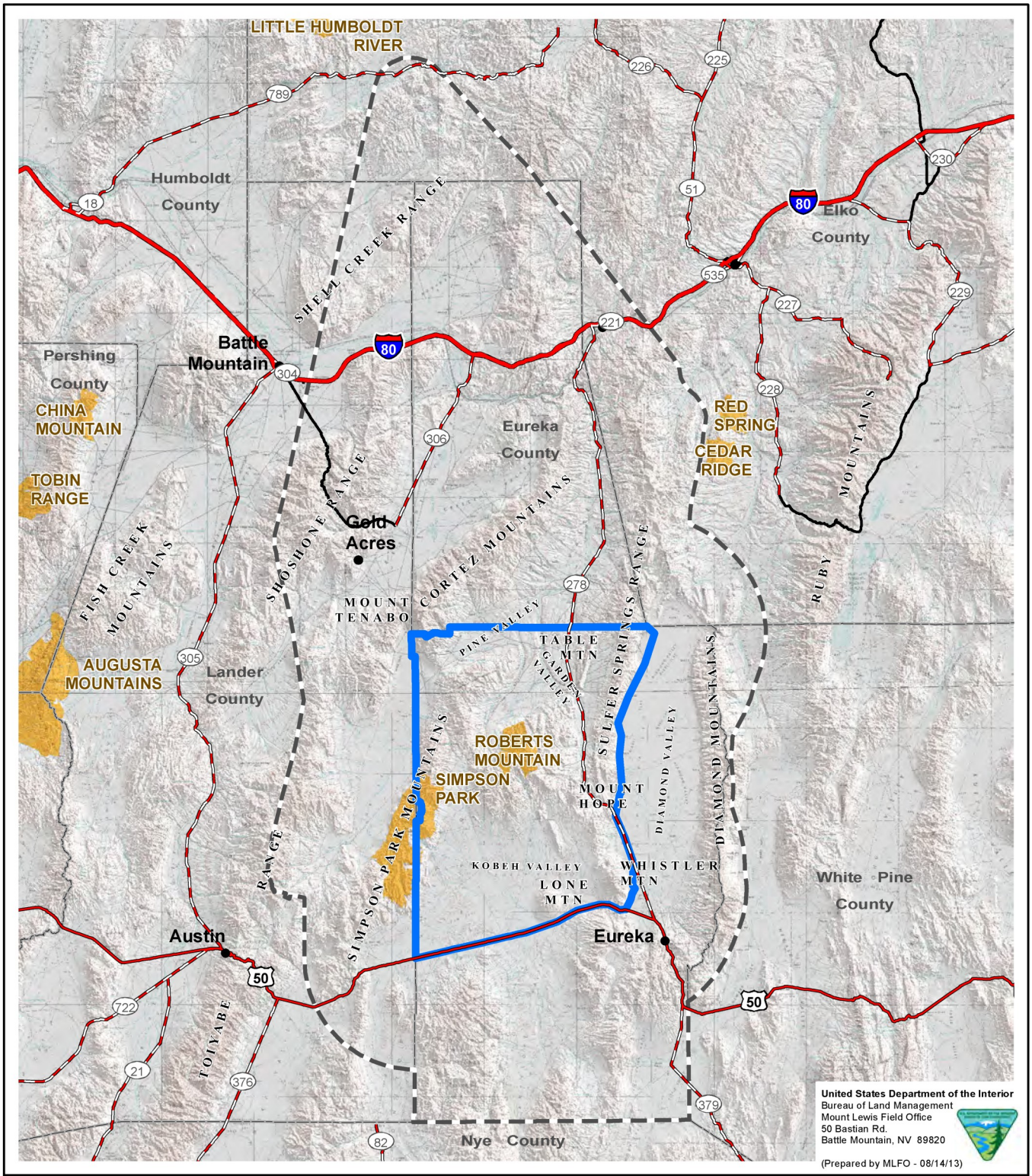
3.3.1 Project Area

The 3 Bars Project area is in northern Eureka County, Nevada (**Figure 3-7**). The project area spans about 750,000 acres and includes three major mountain ranges (Roberts Mountains, Simpson Park Mountains, and the Sulphur Spring Range).

The project area is located in the central portion of the Basin and Range physiographic province. Within the project area, surface elevations range from approximately 10,100 feet above mean sea level (amsl) at the peak of Roberts Mountains in the middle of the project area, to approximately 5,450 feet along Pine Creek at the northern edge of the project area. Other high elevation areas within the project include the Simpson Park Mountains (ranging generally from 7,600 to 8,200 feet amsl) along the western part of the project area, and Table Mountain and the Sulphur Spring Range (the latter ranging generally from 7,400 to 7,800 feet amsl) in the northeast. Lower elevations are approximately 6,070 feet amsl along U.S. Highway 50; approximately 5,830 feet amsl in Diamond Valley, approximately 5,640 feet amsl in the northwest corner of the project area, and approximately 5,480 feet amsl along Henderson Creek in Garden Valley in the northern part of the project area. Block faulting in the area has resulted in generally north-south trending mountain ranges. Structural deformation has resulted in a series of valleys separated by mountain ranges. The three valleys of interest that are within the ecosystem are Diamond, Kobeh, and Pine Valleys (**Figure 3-7)**.

3.3.2 Ecoregions

There are nine ecoregions within the project area (**Figure 3-8**; Bryce et al. 2003**)**. Ecoregions are geographic areas that are delineated and defined by similar climatic conditions, geomorphology, and soils (Bailey 1997, 2002). Since these factors are relatively constant over time and strongly influence the ecology of vegetative communities,



Legend

- Interstate Highway
- U.S. Highway
- State Highway
- Major Road
- City or Town
- CESA Maximum Extent
- Wilderness Study Area
- 3 Bars Project Area

Source: BLM 2012d,g.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-7

Study Area

0 2 4 6 8 10 20 Miles

0 2 4 6 8 10 20 Kilometers

N

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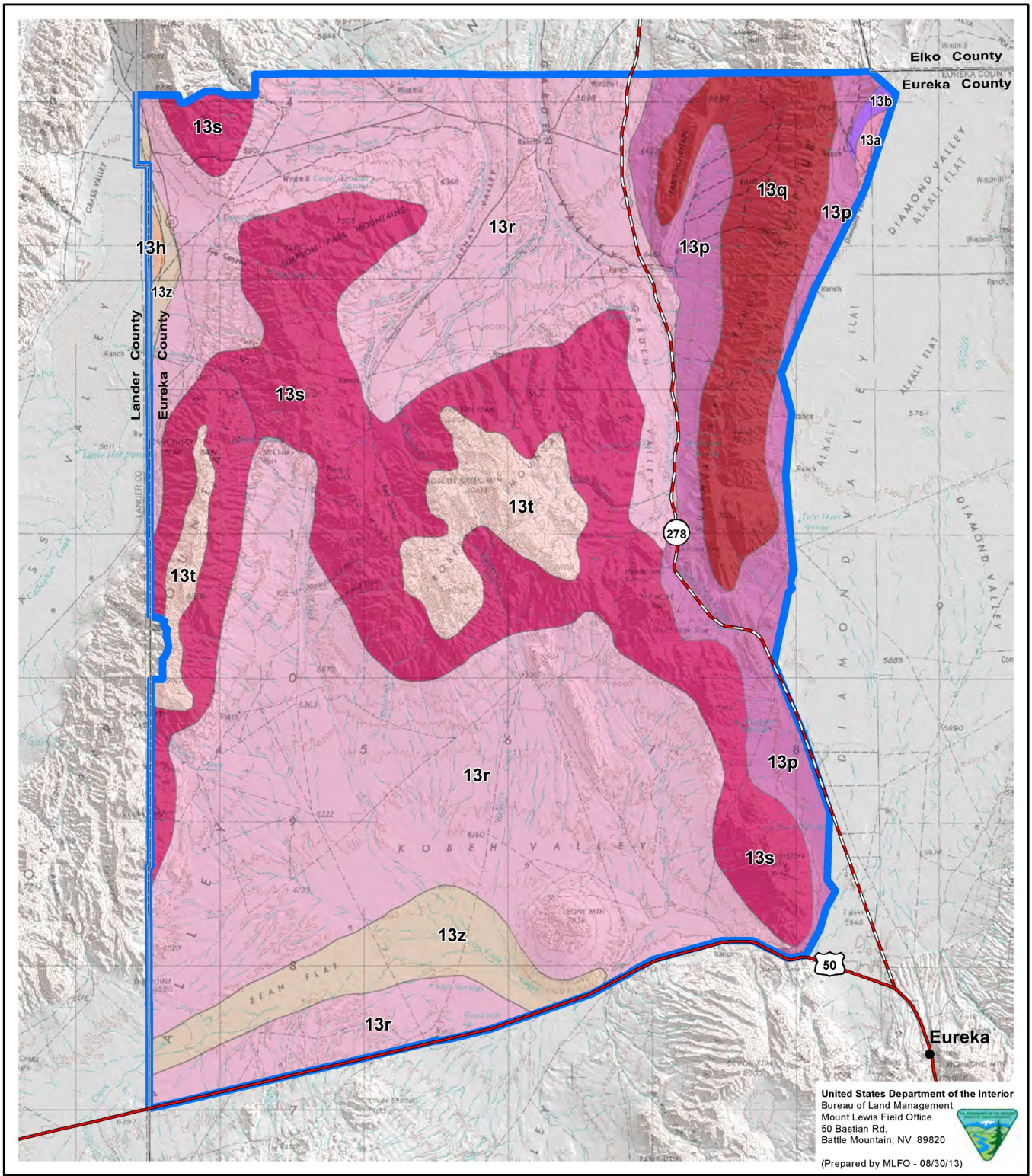

Legend

13 Central Basin and Range

- 13a Salt Deserts
- 13b Shadscale-dominated Saline Basins
- 13h Lahontan and Tonopah Playas
- 13p Carbonate Sagebrush Valleys
- 13q Carbonate Woodland Zone
- 13r Central Nevada High Valleys
- 13s Central Nevada Mid-slope Woodland and Brushland
- 13t Central Nevada Bald Mountains
- 13z Upper Lahontan Basin
- 3 Bars Project Area

Source: USEPA 2012a.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-8

Ecoregions of the 3 Bars Project Area

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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ecoregions may have similar potentials and responses to disturbance (Clarke and Bryce 1997; Jensen et al. 1997). Ecoregions, therefore, provide a useful framework for organizing, interpreting, and predicting changes to vegetation following management treatments. These ecoregions are discussed below.

Several ecological sites occur within each respective ecoregion. Finer scale descriptions of the soils, vegetation, and associated plant community dynamics can be obtained from the ecological site descriptions for the ecological sites correlated to specific soils within the project area. A list of the dominant ecological sites can be found in Section 3.11.2.2 based on ecological site descriptions. Rangeland landscapes are divided into ecological sites for the purposes of inventory, evaluation, and management. An ecological site, as defined for rangeland, is a distinctive kind of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation. The ecological site descriptions are based on physiographic, climatic, vegetative, and soil factors for each soil association.

3.3.2.1 Lahontan and Tonopah Playas

The nearly level and often barren Lahontan and Tonopah Playas ecoregion contains mud flats, alkali flats, and intermittent saline lakes, such as the Black Rock Desert, Carson Sink, and Sarcobatus Flat. Marshes, remnant lakes, and playas are all that remain of Pleistocene Lake Lahontan, which was once the size of Lake Erie. Playas occur at the lowest elevations in the Lahontan Basin and represent the terminus or “sink” of rivers flowing east off the Sierra Nevada. They fill with seasonal runoff from surrounding mountain ranges during winter, providing habitat for migratory birds. Black greasewood or four-winged saltbush may grow around the perimeter in the transition to the salt shrub community, where they often stabilize areas of low sand dunes. This ecoregion has very limited grazing potential. Windblown salt dust from exposed playas may affect upland soils and vegetation. The Lahontan and Tonopah Playas ecoregion is important as wildlife habitat and for some recreational and military uses.

3.3.2.2 Carbonate Sagebrush Valleys

The basins and semi-arid uplands of the Carbonate Sagebrush Valleys ecoregion surround the carbonate ranges of eastern Nevada. Like the ranges, the Carbonate Sagebrush Valleys ecoregion is also largely underlain by limestone or dolomite. The combination of summer moisture and a limestone or dolomite substrate affects regional vegetation, particularly in terms of species dominance and elevational distribution. The substrate favors shrubs, such as black sagebrush and winterfat, which can tolerate shallow soil. Even in alluvial soils, root growth may be limited by a hard pan or caliche layer formed by carbonates leaching through the soil and accumulating. As a result, shrub cover is sparse in contrast to other sagebrush-covered ecoregions in Nevada, including the Central Nevada High Valleys ecoregion. The grass understory grades from a dominance of cool season grasses, such as bluebunch wheatgrass, in the north, to warm season grasses, such as blue grama (an indicator of summer rainfall), in the south.

3.3.2.3 Carbonate Woodland Zone

In the Carbonate Woodland Zone ecoregion the singleleaf pinyon pine and Utah juniper woodland canopy overtops and spans the existing sagebrush and mountain brush communities. The pinyon-juniper woodland has a broader elevational range in the carbonate areas of eastern Nevada than elsewhere in the region, even extending onto the floors of the higher basins, partially because of greater summer precipitation. Both pinyon and juniper decline north of this ecoregion. Historically, miners cut pinyon and juniper for mine timbers. Since the beginning of fire suppression early in the last century, pinyon-juniper woodland has increased in density and expanded into lower sagebrush zones. The woodland understory is diverse due to the influence of carbonate substrates and summer rainfall. There are more

springs and live streams in this ecoregion than in western non-carbonate woodlands (e.g., Central Nevada Mid-Slope Woodland and Brushland ecoregions) because the carbonate substrate is soluble and porous, allowing rapid infiltration.

3.3.2.4 Central Nevada High Valleys

The Central Nevada High Valleys ecoregion contains sagebrush-covered rolling valleys that are generally over 5,000 feet amsl in elevation. Alluvial fans spilling from surrounding mountain ranges fill the valleys, often leaving little intervening flat ground. Wyoming big sagebrush and associated grasses are common on the flatter areas, and black sagebrush dominates on the volcanic hills and alluvial fans. This ecoregion tends to have a lower species diversity than many other sagebrush-dominated ecoregions (including the Carbonate Sagebrush Valleys ecoregion) because of its aridity and its isolation from more species-rich areas. Saline playas may occur on available flats. Less shadscale and fewer associated shrubs surround these playas compared to other lower, more arid ecoregions to the west. Valleys with permanent water support endemic fish species, such as the Monitor Valley speckled dace.

3.3.2.5 Central Nevada Mid-slope Woodland and Brushland

The Central Nevada Mid-slope Woodland and Brushland ecoregion at 6,500 to 8,000 feet amsl is analogous in altitudinal range to other woodland areas in Nevada. However, continuous woodland is not as prevalent on the mountains of central Nevada as in other woodland ecoregions. Pinyon–juniper grows only sparsely through the shrub layer due to the combined effects of past fire, logging, and local climate factors, including lack of summer rain and the pattern of winter cold air inversions. Where extensive woodlands do exist, understory diversity tends to be very low, especially in closed canopy areas. Areas of black and Wyoming big sagebrush grade upward into mountain big sagebrush and curl-leaf mountain mahogany, which straddles the transition between this mid-elevation brushland and the mountain brush zone of the higher Central Nevada Bald Mountains ecoregion.

3.3.2.6 Central Nevada Bald Mountains

The Central Nevada Bald Mountains ecoregion is dry and mostly treeless. Although they rise only a hundred miles east of the Sierra Nevada, they lack Sierra Nevada species because of the dry conditions. These barren-looking mountains are covered instead by dense mountain brush that is dominated by mountain big sagebrush, western serviceberry, snowberry, and low sagebrush. In moister microsites, scattered groves of curl-leaf mountain mahogany and quaking aspen (aspen) grow above the shrub layer. A few scattered limber pines grow on ranges that exceed 10,000 feet amsl. The Toiyabe Range is high enough to have an alpine zone, but it lacks a suitable substrate to retain snowmelt moisture. The isolation of these “sky islands” has led to the evolution of many rare and endemic plant species.

3.3.2.7 Upper Lahontan Basin

The Upper Lahontan Basin ecoregion lies outside of the rain shadow cast by the Sierra Nevada and records somewhat higher rainfall and cooler temperatures than other portions of the Lahontan Basin. It is characterized by the shadscale and greasewood plant community, with Thurber’s needlegrass common in the understory. This ecoregion has a shorter growing season than the rest of the Lahontan Basin.

3.3.2.8 Salt Deserts

The Salt Deserts ecoregion is composed of nearly level playas, salt flats, mud flats, and saline lakes. These features are characteristic of those in the Bonneville Basin; they have a higher salt content than the Lahontan and Tonopah Playas. Water levels and salinity fluctuate from year to year; during dry periods salt encrustation and wind erosion occur. Vegetation is mostly absent although scattered salt-tolerant plants, such as pickleweed, iodine bush, black greasewood, and inland saltgrass, occur. Soils are not arable, and there is very limited grazing potential. The salt deserts provide wildlife habitat, and serve some recreational, military, and industrial uses.

3.3.2.9 Shadscale-dominated Saline Basins

The Shadscale-dominated Saline Basins ecoregion is arid, internally drained, and gently sloping to nearly flat. These basins are higher in elevation and colder in winter than the Lahontan Salt Shrub Basin to the west. Light-colored soils with high salt and alkali content occur and are dry for extended periods. The saltbush vegetation common to Shadscale-dominated Saline Basins Ecoregion has a higher tolerance for extremes in temperature, aridity, and salinity than big sagebrush, which dominates the Sagebrush Basins and Slopes ecoregion at somewhat higher elevations. The basins in Nevada, in contrast to those in Utah, are more constricted in area and more influenced by nearby carbonate mountain ranges, which provide water by percolation through the limestone substrate to valley springs. Isolated valley drainages support endemic fish, such as the Newark Valley tui chub.

3.4 Meteorology and Climate Change

3.4.1 Regulatory Framework

On October 30, 2009, the USEPA published a rule for the mandatory reporting of greenhouse gases (40 CFR § 98) from large greenhouse gas emissions sources in the U.S. Implementation of 40 CFR § 98 is referred to as the Greenhouse Gas Reporting Program. 40 CFR § 98 applies to direct greenhouse gas emitters, fossil fuel suppliers, and industrial gas suppliers. This comprehensive, nationwide emissions data will provide a better understanding of where greenhouse gases are coming from and will guide development of the policies and programs to reduce emissions. The publicly available data will allow greenhouse gas emitters to track their own emissions and compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. In general, the threshold for reporting is 25,000 metric tons or more of carbon dioxide (CO_2) equivalent per year. Reporting is at the facility level, except for certain suppliers of fossil fuels and industrial greenhouse gases. An estimated 85 to 90 percent of the total U.S. greenhouse gas emissions from approximately 10,000 facilities are covered by this final rule. Most small businesses and mining operations would fall below the 25,000 metric ton threshold and are not required to report greenhouse gas emissions to USEPA.

3.4.2 Affected Environment

3.4.2.1 Meteorology

Limited meteorological data have been collected in the 3 Bars Project area. Baseline meteorological conditions representative of the project area were assessed using data from nearby monitoring stations in north-central Nevada. Meteorological data from the Elko, Nevada airport, 70 miles north of the project area, was utilized for climate characterization. The Elko monitoring station measures ambient temperature, wind speed, wind direction, and

precipitation at an elevation of approximately 5,080 feet amsl. Meteorological data from the Mercury-Desert Rock monitoring station was also used because the Nevada Bureau of Air Pollution Control (Nevada BAPC) determined that the meteorological data at that site are most representative for the project area.

Local climatic factors include the occurrence of cold air inversions during winter and scarce summer rain. Average maximum temperatures are 86 degrees Fahrenheit (°F) in July, while average minimum temperatures are 17 °F in January.

Mean annual precipitation varies directly with elevation, ranging from approximately 8 inches per year in the lower valley floors, up to approximately 18 inches per year at the highest elevations in the Roberts Mountains (USDA Natural Resources Conservation Service 1998). Most of the study area receives between 10 and 16 inches of precipitation in an average year. Nearby long-term regional climate stations are at Eureka (station elevation 6,540 feet amsl) and at a USDA site to the north in Diamond Valley (station elevation 5,970 feet amsl). For the Eureka station, averages are indicated in **Table 3-3** (Western Region Climate Center 2012).

The precipitation climate in the project area is classified as arid, with elevations below 6,500 amsl feet receiving the least amount of precipitation (5 to 9 inches per year), while the mountainous areas are significantly wetter, receiving 11 to over 16 inches of precipitation annually (Western Region Climate Center 2012). An arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges. Net evaporation exceeds precipitation in the project area.

Most precipitation accumulates as snow on the mountain ranges. During the spring snowmelt period, water flows from the mountain ranges into the basin fill deposits. As water flows from areas of bedrock outcrop in the mountains toward the valley, it rapidly infiltrates into the basin fill deposits along the range fronts. Thus, most recharge into the basin fill deposits occurs along the margins of the valleys or at higher elevations and not in the central portion of the valleys. However, some streams may flow into the central valley during times of high runoff, causing water to accumulate in the playas (Western Region Climate Center 2012).

The BLM operated 3 flow-recording stations and 20 bulk precipitation collection stations in the Coils Creek watershed, a 50-square mile area in the northwestern part of Kobeh Valley, from 1963 to 1980 (Houng-Ming et al. 1983). The average annual precipitation was 11.4 inches during the period, but they did not find an increase in precipitation with altitude, which is uncommon in the Great Basin, where orographic lift effects usually produce a well-defined elevation-to-precipitation relationship. Orographic lift occurs when an air mass is forced from a low elevation to a higher elevation as it moves over rising terrain, and often generates clouds and precipitation. The precipitation data from the Coils Creek watershed may indicate unusual storm tracks, a lack of orographic lift effect, or potentially a data problem that cannot be resolved with existing information (Montgomery and Associates 2010).

3.4.2.2 Climate Change

Ongoing scientific research has identified the potential impacts of man-made greenhouse gas emissions and changes in biological carbon sequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these greenhouse gas emissions cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although greenhouse gas levels have varied for millennia, recent industrialization and burning of fossil fuels have caused CO_2 (a greenhouse gas) concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change (2007) recently concluded that “warming of the climate system is

unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Several activities contribute to the phenomena of climate change, including emissions of greenhouse gasses (especially CO_2 and methane) from fossil fuel development, large wildfires, and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity from the earth's surface (albedo). It is important to note that greenhouse gasses would have a sustained climatic impact over different temporal scales. For example, recent emissions of CO_2 can influence climate for more than 100 years (Intergovernmental Panel on Climate Change 2007).

Global mean surface temperatures have increased nearly 1.8 °F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24° North) have exhibited temperature increases of nearly 2.1 °F since 1900, with nearly a 1.8 °F increase since 1970. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of greenhouse gasses are likely to accelerate the rate of climate change.

In 2001, the Intergovernmental Panel on Climate Change indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4 °F above 1990 levels. The National Academy of Sciences (2010) agrees with these findings, but also has indicated there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature would not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere and reduce soil moisture, which would increase generalized drought conditions and enhance heavy storm events. Although large-scale spatial shifts in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

TABLE 3-3

Monthly Climate Summary for Eureka, Nevada (1888 through 2012)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation (inches)	1.07	1.05	1.34	1.34	1.42	0.84	0.68	0.78	0.77	0.89	0.78	0.89	11.85
Total Snowfall (inches)	9.4	9.8	10.2	7.0	3.7	0.4	0.1	0.0	0.6	2.4	6.1	9.4	59.0
Average Maximum Temperature (°F)	38.3	41.2	48.3	57.0	66.0	77.2	86.4	84.3	74.9	63.3	48.8	39.7	60.4
Average Minimum Temperature (°F)	17.1	19.2	23.9	28.9	36.4	44.1	52.9	52.0	43.7	34.6	24.5	18.3	33.0

Source: Western Region Climate Center (2012).

Karl et al. (2009) assessed the effects of global climate change impacts in the U.S. They noted that the average temperature in the Southwestern U.S. has increased about 1.5 °F compared to the 1960-1979 baseline, and is predicted to increase 4 to 10 °F above the historical baseline by the end of the century. Although the Southwest experiences frequent droughts, recent warming in the Southwest is among the most rapid in the nation. This is causing declines in spring snowpack and water in some areas in the Southwest has become limited. Climate change is projected to cause substantial reductions in rain and snowfall in the spring months, when precipitation is most needed to fill reservoirs. Despite the greater likelihood of drought, however, the incidence of flooding is expected to increase as the precipitation rate exceeds the infiltration rate, with a trend toward both more frequent extremely dry and extremely wet winters. With warmer temperatures, more precipitation will fall as rain than as snowfall. The increase in rain on snow events will also cause rapid runoff and flooding.

Because of temperature increases, pinyon-juniper woodlands in portions of the Southwest are dying off, and area burned by wildfires is expected to increase. However, where fire is limited by the availability of fine fuels, such as occurs in the 3 Bars Project area, fire frequency is expected to decrease. Temperature increase is projected to increase the amount of grassland acreage, and acreage dominated by invasive vegetation, such as red brome, that do well in high temperatures (Karl et al. 2009).

Climate change is predicted to increase water temperature in most regions including the arid Southwest (Meyer et al. 1999). The effect of increased water temperature on aquatic habitat and species could include changes in water quality (e.g., dissolved oxygen) and biological conditions such as direct mortality from acute temperature stress, sublethal stress on physiological functions, and shifts in species distributions. In North America, the Intergovernmental Panel on Climate Change predicted that coldwater fisheries would likely be adversely affected, warmwater fish species generally would be positively affected, and cool water fisheries would have a mixture of positive and negative changes in terms of habitat conditions and species distribution and diversity. In general, climatic warming would result in a general shift in species distributions northward, with extinctions of cool-water species at lower altitudes and range expansion of warmwater and cool-water species into higher altitudes (Meyer et al. 1999).

As a means of assessing the vulnerability of species to climate change, NatureServe initiated a collaborative effort to develop a Climate Change Vulnerability Index (Young et al. 2009). The Index was applied to a selection of test species in Nevada, where it will be used to modify the State Wildlife Action Plan by incorporating climate change species information. Based on this initial case study (Young et al. 2009) and subsequent analyses by the Nevada Natural Heritage Program (2011), vulnerability index ratings for aquatic species provide some indication of potential effects of climate change in Nevada. The index score was moderately vulnerable for Lahontan cutthroat trout, a federally listed threatened species under the Endangered Species Act that is found on the 3 Bars Project area. The analysis also predicted that the abundance and/or range extent of this species within the geographical area assessed likely would decrease by 2050.

3.4.3 Environmental Consequences

3.4.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, a number of concerns specific to meteorology and climate were identified and are discussed in this section. These include:

- Concern that big fire years are a result of climate change, and are beyond agency control.

- The potential adverse effects of climate change and increasing temperatures, including on noxious weeds and other invasive non-native vegetation problems, alterations in runoff, and reduction in perennial flows, and changes to upland conditions.
- Whether 3 Bars Project actions may promote desertification, global warming, and climate change processes.
- The current degree of desertification that exists across the District and on adjacent lands and how climate change may exacerbate effects of deforestation and/or sagebrush removal or eradication effects.
- Effects of global warming and climate change, and increased risk of site desertification and noxious weeds and other invasive non-native vegetation invasion following treatment, grazing, or other and overlapping disturbances.

3.4.3.2 Direct and Indirect Effects

3.4.3.2.1 Direct and Indirect Effects Common to All Action Alternatives

The combustion of fossil fuels would release CO_2 to the atmosphere. The use of chainsaws, and vehicles to transport workers, would be the primary sources of CO_2 emissions common to all alternatives. These emissions would have a negligible effect on global climate change. Treatments would help to improve ecosystem health and reduce the risk of wildfire and associated smoke emissions, to the benefit of the global climate.

3.4.3.2.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Prescribed fire and wildland fire for resource benefit, and use of equipment for mechanical treatments and to transport workers, would be the primary sources of CO_2 emissions. ENSR (2005a) modeled annual CO_2 emissions for BLM vegetation treatments for the 17-States PEIS and PER (USDOI BLM 2007b, c). Based on modeling done for Nevada, the acreage treated on the 3 Bars Project area would comprise about 4 percent of acres treated by the BLM annually in Nevada and would contribute about 19,115 tons of CO_2 to the atmosphere annually. The actual amount of emissions could vary from estimates from modeling based on differences in the acres and types of vegetation treated under each method. However, in the context of CO_2 emissions from BLM treatments in Nevada, and from other sources of CO_2 emissions in the region, CO_2 emissions for the 3 Bars Project would be negligible. Treatments to improve the health and resiliency of native vegetation, thin and remove pinyon-juniper, and control cheatgrass and other noxious weeds and other invasive non-native vegetation should help to reduce the occurrence of wildfire and associated CO_2 emissions from wildfire smoke.

3.4.3.2.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the BLM would not use prescribed fire and wildland fire for resource benefit and thus CO_2 emissions from those sources would not occur under this alternative. Mechanical treatments contribute negligible amounts of CO_2 emissions. Based on modeling, the 3 Bars Project would contribute about 5,600 tons of CO_2 to the atmosphere annually under Alternative B. The actual amount of emissions could vary from estimates from modeling based on differences in the acres and types of vegetation treated under each method. Because prescribed fire and wildland fire for resource benefit would not be used under this alternative to thin and remove pinyon-juniper and improve the health and resiliency of native vegetation, the occurrence of wildfire and associated smoke production may be greater under this alternative than under Alternative A.

3.4.3.2.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The BLM would only use manual and classical biological treatments under Alternative C. Based on modeling, these methods would contribute only about 2 tons of CO_2 emissions annually. Because these treatments would do little to improve ecosystem health and reduce wildfire risk, smoke emissions from wildfire would likely be greater under this alternative than under Alternatives A and B.

3.4.3.2.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct CO_2 emissions under this alternative as no treatments would be authorized. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, the 3 Bars Project area would be subject to large-scale wildfires with potentially uncontrolled dense smoke emissions. Carbon dioxide emissions from wildfires would likely be greater under Alternative D than under the action alternatives.

3.4.3.3 Cumulative Effects

The effects of changing climate on future fire regimes and CO_2 emissions are difficult to predict, not only due to uncertainties associated with future climate, but because of interactive effects between climate change, biological factors, and vegetation treatment activities, and politics.

Cumulative impacts to climate change could result from CO_2 emissions from a number of sources within the CESA that are associated with reasonably foreseeable land development and utility and infrastructure projects. Mechanical equipment would be used during construction of utility and infrastructure projects, and construction workers and users of the facilities would travel by vehicle to project sites. Technology, however, will continue to play an important role in reducing CO_2 emissions from engine operations. Wildfires would continue to be the primary contributors to CO_2 emissions in the CESA.

3.4.3.4 Significance of the Effects under the Alternatives

A significant adverse effect on climate is not likely to be caused by BLM restoration activities. Treatments that improve ecosystem health and reduce hazardous fuels buildup, thereby reducing the risk of wildfire, should provide long-term benefits to local and regional air quality (USDOI BLM 2007c:4-9). Nationally, there were about 7,385 million tons of greenhouse gas emissions in 2011 (USEPA 2012). The Mount Hope Project would be a contributor to greenhouse gases, and based on modeling, would emit up to approximately 604,000 tons per year of greenhouse gases, or approximately 0.00008 percent of the national annual emissions. Other developments in the CESA would contribute negligible amounts of greenhouse gases. The 3 Bars Project would contribute about 0.000003 percent to the national annual greenhouse gas emissions under Alternative A, and even less under the other alternatives.

3.5 Air Quality

3.5.1 Regulatory Framework

Ambient air quality and the emission of air pollutants are regulated under both federal and state laws and regulations. Regulations potentially applicable to the proposed action and alternatives include the following: Federal Clean Air

Act (Clean Air Act) and National Ambient Air Quality Standards (NAAQS), Nevada AAQS, Prevention of Significant Deterioration (PSD), New Source Performance Standards, Federal Operating Permit Program (Title V), and State of Nevada air quality regulations (Nevada Administrative Code 445B).

3.5.1.1 Federal Clean Air Act and National Ambient Air Quality Standards

The Clean Air Act and the subsequent Clean Air Act amendments of 1990 require the USEPA to identify NAAQS to protect the public health and welfare. The Clean Air Act and amendments establish NAAQS for seven pollutants, known as "criteria" pollutants because the ambient standards set for these pollutants satisfy "criteria" specified in the Clean Air Act. The criteria pollutants regulated by the Clean Air Act and their applicable NAAQS set by the USEPA are listed in **Table 3-4**. The list of criteria pollutants is amended by the USEPA as needed to protect public health and welfare. The most recent revisions include amendments to standards for the following pollutants (dates represent publication in the Federal Register): particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) and particulate matter less than ten micrometers in aerodynamic diameter (PM_{10}; October 2006), ozone (O_3; March 2008), lead (Pb; November 2008), nitrogen dioxide (NO_2; February 2010), and sulfur dioxide (SO_2; June 2010).

TABLE 3-4

National and Nevada Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards[1]	National Standards[1]	
			Primary	Secondary
Ozone (O_3)	1-Hour	235	235	235
	8-Hour	NA	157	157
Carbon monoxide (CO)	1-Hour	40,500	40,000	40,000
CO less than 5,000 feet amsl	8-Hour	10,500	10,000	10,000
CO at or greater than 5,000 feet amsl	8-Hour	7,000		
Sulfur dioxide (SO_2)	1-Hour	NA	197	NA
	3-Hour	1,300	N/A	1,300
	24-Hour	365	NA	NA
	Annual Average	80	NA	NA
Nitrogen dioxide (NO_2)	1-Hour[2]	NA	189	NA
	Annual Average	100	100	100
Particulate matter with aerodynamic diameter of 10 microns or less (PM_{10})	24-Hour	150	150	150
	Annual Average	50	NA	NA
Particulate matter with aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$)	24-Hour	35	35	35
	Annual Average	12	12	12

[1] Micrograms per cubic meter ($\mu g/m^3$).

[2] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitoring site within an area must not exceed 189 $\mu g/m^3$ (0.100 parts per million [ppm]).

N/A = Not applicable.

Sources: Nevada Division of Environmental Protection (2012) and USEPA (2012).

3.5.1.2 Nevada State Ambient Air Quality Standards

The Nevada Administrative Code 445B.22097 includes AAQS for the State of Nevada (**Table 3-4**). The Nevada AAQS are generally identical to the NAAQS, with the exception of the following:

- Nevada has not formally adopted the 8-hour O_3 standard adopted by the USEPA in 2008.
- Nevada has not formally adopted the recently promulgated 1-hour NAAQS standards for NO_2 and SO_2.
- Nevada retains the state standard for PM_{10} (annual arithmetic mean) where the comparable NAAQS standard was revoked by the USEPA in 2006.
- Nevada has not formally adopted the 24-hour and annual NAAQS standards for $PM_{2.5}$ promulgated by USEPA in 2006.
- Nevada has an additional state standard for carbon monoxide (CO) in areas with an elevation in excess of 5,000 feet amsl.

3.5.1.3 Attainment and Non-attainment Areas and Prevention of Significant Deterioration

Pursuant to the Clean Air Act, the USEPA has developed classifications for distinct geographic regions known as air quality management areas. Under these classifications, for each federal criteria pollutant, each air basin (or portion of an air quality management area (AQMA) [or "planning area"]) is classified as "in attainment" if the AQMA has "attained" compliance with (i.e., not exceeded) the adopted NAAQS for that pollutant; is classified as "non-attainment" if the levels of ambient air pollution exceed the NAAQS for that pollutant; or is classified as "maintenance" if the monitored pollutants have fallen from non-attainment levels to attainment levels. Air quality management areas for which sufficient ambient monitoring data are not available are designated as "attainment unclassifiable" for those particular pollutants until actual monitoring data support formal "attainment" or "non-attainment" classification.

In addition to the designations relative to attainment of conformance with the NAAQS, the Clean Air Act requires the USEPA to place each planning area within the U.S. into one of three PSD classes, which are designed to limit the deterioration of air quality when it is "better than" the NAAQS. "Class I" is the most restrictive air quality category and was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size which were in existence prior to 1977, or those additional areas that have since been designated Class I under federal regulations (40 CFR § 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II planning areas, which allow a relatively greater deterioration of air quality. For future re-designation purposes, Congress defined as Class III any existing Class II area for which a state may desire to promote a higher level of industrial development (and emissions growth). Thus, Class III areas are allowed to have the greatest amount of pollutant increase of the three area classes while still achieving the NAAQS. There have been no Class III re-designations to date. Regardless of the class of the planning area, the air quality cannot exceed the NAAQS. The nearest Class I planning area to the project, the Jarbidge Wilderness Area, is approximately 130 miles northeast of the project area. There are no Class I airsheds within 60 miles of the project area.

Federal PSD applicability regulations limit the maximum allowable increase in ambient particulate matter in a Class I planning area, resulting from a major or minor stationary source, to 4 micrograms per cubic meter ($\mu g/m^3$; annual geometric mean) and 8 ug/m^3 (24-hour average). For Class II planning areas, the maximum allowable increase is 17 $\mu g/m^3$ (annual geometric mean) and 30 $\mu g/ m^3$ (24-hour average). Specific types of facilities that emit, or have the potential to emit, 100 tons per year (tpy) or more of PM_{10} or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tpy or more of PM_{10} or other criteria air pollutants, is considered a major stationary source. A stationary source that emits less than 100 tpy of criteria pollutants and less than 10 tpy of individual

hazardous air pollutants, and less than 25 tpy of hazardous air pollutants in the aggregate, would be considered a minor source. The proposed 3 Bars Project would be classified as a minor source.

Fugitive emissions are not included as part of the calculation to determine if a proposed source is a major source of emissions for PSD purposes. Permit applicants for proposed major stationary sources or major modification to a source are required to notify federal land managers of Class I planning areas within 60 miles of the new or modified major stationary source. There are no Class I planning areas within 60 miles of the project area. Air pollutant emission sources under the proposed action and alternatives, including from prescribed burning, are minor stationary sources that are not subject to PSD regulatory requirements.

Since the proposed 3 Bars Project would not be a PSD source, there is no air quality permit requirement to assess impacts to Class I areas; however, Class I areas are protected by federal land managers who manage air quality related values (AQRVs) such as visibility and atmospheric deposition. Though not a regulatory program under PSD, federal land managers review the issuance of a PSD permit for any impacts that exceed guideline thresholds for visibility, atmospheric deposition, and changes in the acid neutralizing capacity of sensitive lakes. The federal land managers consider a source greater than 30 miles from a Class I area to have negligible impacts with respect to Class I AQRVs if the total SO_2, nitrous oxides (NO_x), PM_{10}, and sulfuric acid (H_2SO_4) annual emissions (in tons per year, based on 24-hour maximum allowable emissions), divided by the distance (in kilometers [km]) from the Class I area (Q/D), is 10 or less. In general, the Federal Land Managers' Air Quality Related Values Work Group recommends that an applicant apply the Q/D test for proposed sources greater than 50 km (30 miles) from a Class I area to determine whether or not any further AQRV analysis is necessary (USDA Forest Service et al. 2010). Federal agencies would not request any further Class I AQRV impact analyses from sources with a Q/D ratio that is 10 or less.

3.5.1.4 Nevada Air Quality Operating Permit

The Clean Air Act delegates primary responsibility for air pollution control to state governments, which in turn often delegate this responsibility to local or regional organizations. The State Implementation Plan was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the NAAQS. The function of a State Implementation Plan broadened after passage of the Clean Air Act and now includes the implementation of specific technology based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and PSD of air quality within regional planning areas and statewide. Section 176 of the Clean Air Act, as amended, requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a State Implementation Plan for the purpose of attaining ambient air quality standards.

The Nevada BAPC is the agency in the State of Nevada with the responsibility for implementing a State Implementation Plan (excluding Washoe and Clark Counties, which have their own State Implementation Plans). Included in a State Implementation Plan are the State of Nevada air quality permit programs (Nevada Administrative Code 445B.001 through 445B.3485, inclusive) and the Nevada State AAQS (**Table 3-4**). In addition to establishing the Nevada State AAQS, the Nevada BAPC is responsible for permit and enforcement activities throughout the State of Nevada (except in Clark and Washoe Counties).

The 3 Bars Project is in Eureka County, Nevada. The applicable permitting authority for the county is the Nevada BAPC. Before any construction of a potential source of air pollution can occur, an air quality operating permit application must be submitted to the Nevada BAPC in order to obtain an Air Quality Operating Permit.

3.5.1.5 Burn Management

The *Battle Mountain District Fire Management Plan* (Fire Management Plan) was approved in 2004 and provides program guidance based on the *Land-use Plan Amendment for Fire Management for the Shoshone-Eureka RMP* (USDOI BLM 2004a). Fire management in the 3 Bars Project area is discussed in more detail in Section 3.13, Wildland Fire.

The Eureka County Master Plan discusses air quality and makes these recommendations regarding air quality within the County (Eureka County 2010). These include:

- Prevent significant deterioration of the superior air quality found in Eureka County.
- Review best management practices as necessary to assure applicability and compliance.

3.5.2 Affected Environment

3.5.2.1 Study Methods and Study Area

No air quality data have been collected in the 3 Bars Project area. Baseline air quality conditions representative of the project area were assessed using data from nearby monitoring stations in north-central Nevada. Meteorological data from the Elko, Nevada, airport (WBO262573), 70 miles north of the project area, were used for climate characterization (**Figure 3-1**). Upper air meteorological data from the Mercury-Desert Rock monitoring station, about 200 miles south of the project area, were used for air dispersion modeling. The Mercury-Desert Rock monitoring station was used because the Nevada BAPC determined that the meteorological data at that site are most representative for the project area.

The study area for direct and indirect impacts to air quality is the 3 Bars Project area and local airshed. The cumulative effects study area includes the Hydrologic Unit Code 10 watersheds that are all or partially included in the 3 Bars Project area.

3.5.2.2 Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors have been used to establish a definition of air quality. Measurement of pollutants in the atmosphere is expressed in units of parts per million (ppm) or $\mu g/m^3$. Both long-term climatic factors and short-term weather fluctuations are considered part of the air quality resource because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify acceptable upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards generally are not considered to be detrimental to public health and welfare (USEPA 2012).

The air quality within the study area is typical of the largely undeveloped regions of the western U.S. For the purposes of statewide regulatory planning, the area has been designated as in attainment for all pollutants that have an AAQS.

Important sources of air pollutants in the area include several precious metals mines that are sources for PM_{10} and $PM_{2.5}$. No areas in Nevada are currently designated as nonattainment of the $PM_{2.5}$ standard. There is a lack of sufficient data to develop a comprehensive emissions inventory for $PM_{2.5}$ from mine sources; nevertheless, an

acceptable approach for assessing $PM_{2.5}$ emissions from fugitive dust sources is to use a percentage of the PM_{10} emissions.

Three important meteorological factors influence the dispersion of pollutants in the atmosphere—mixing height, wind (speed and direction), and stability. Mixing height is the height above ground within which rising warm air from the surface would mix by convection and turbulence. Local atmospheric conditions, terrain configuration, and pollutant source location determine dilution of pollutants in this mixed layer. Mixing heights vary diurnally, with the passage of weather systems, and with season. For the study area, the mean annual morning mixing height is estimated to be approximately 1,000 feet amsl; however, during the winter months the mean morning mixing height is approximately 80 feet above ground (Holzworth 1972). The mean annual afternoon mixing height exceeds 7,400 feet amsl.

Wind speed has an important effect on area ventilation and the dilution of pollutants. Light winds, in conjunction with large source emissions, may lead to an accumulation of pollutants that can stagnate or move slowly to downwind areas. During stable conditions, downwind usually means down valley or toward lower elevations. Climate data from Elko indicate that the potential for air pollution episodes to last 5 or more days is nearly zero (Holzworth 1972). A potential air pollution episode is defined as a period of time with wind speeds less than 4 miles per hour and mixing heights less than 3,300 feet amsl.

Morning atmospheric conditions tend to be stable because of the rapid cooling of the layers of air nearest the ground. Afternoon conditions, especially during the warmer months, tend to be neutral to unstable because of the rapid heating of the surface under clear skies. During the winter, periods of stable afternoon conditions may persist for several days in the absence of the synoptic (continental scale) storm systems that can generate higher winds with more turbulence and mixing. A high frequency of inversions at lower elevations during the winter can be attributed to the nighttime cooling and sinking air flowing from higher elevations to the low-lying areas in the basins. Although winter inversions are generally not very deep they tend to be more stable because of reduced surface heating (Holzworth 1972).

Because of the typically dry atmosphere, bright sunny days and clear nights frequently occur. This in turn allows rapid heating of the ground surface during daylight hours and rapid cooling at night. Since heated air rises, and cooled air sinks, winds tend to blow uphill during the daytime and down slope at night. This upslope and down slope cycle generally occurs in all the geographical features, including mountain range slopes and river courses. The volume of air affected depends on the area of the feature; the larger the horizontal extent of the feature, the greater the volume of air that moves in the cycle. The complexity of terrain features cause complex movements in the cyclic air patterns, with thin layers of moving air embedded within the larger scale motions. The lower level, thermally driven winds also are embedded within larger-scale upper wind (synoptic) systems. Synoptic winds in the region are predominantly west to east, characterized by daily weather variations that enhance or diminish the boundary layer winds, and significantly channeled by regional and local topography (Western Region Climate Center 2012).

3.5.3 Environmental Consequences

3.5.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, one commenter asked that the current air quality be assessed and the impacts to air from multiple or overlapping treatments be assessed.

3.5.3.2 Significance Criteria

Impacts to air quality would be considered significant if BLM actions resulted in a:

- Violation of any regulatory requirement of the Nevada BAPC.
- Violation of any state or federal ambient air quality standard.
- Substantial contribution to an existing or projected air quality violation.
- Exposure of sensitive receptors to substantial pollutant concentrations.

A substantial contribution to an existing or projected air quality violation could occur if the contribution of project-related pollutants results in a violation of the NAAQS, or if the pollutant is among the top percentage contributors to the ambient concentrations of pollutants from multiple sources.

Sensitive receptors include hospitals, schools, daycare facilities, elderly housing, and convalescent facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants. Extra care must be taken when dealing with contaminants and pollutants in close proximity to areas recognized as sensitive receptors (USEPA 2012).

3.5.3.3 Direct and Indirect Effects

3.5.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Adverse Effects

Air quality would be affected by vegetation treatment activities, including dust and combustion engine exhaust from manual treatments. However, effects would be small in scale, temporary, and quickly dispersed throughout the treatment area. Provided SOPs are followed, and site-specific plans are developed and reviewed before a treatment activity occurs, federal, state, and local air quality regulations would not be violated.

Primary sources of PM_{10} and $PM_{2.5}$ emissions include road dust from unpaved roads and wind erosion on disturbed land. Emissions also include engine exhaust, tire and brake wear, and fugitive dust generated from travel on paved roads. These emissions would have an incremental but insignificant impact on the air quality in the vicinity of roads throughout the project area.

Treatment methods would have minor air quality impacts that would be temporary, transitory, and limited to the immediate vicinity of the specific activity. Combustion of diesel in transport trucks and mobile equipment, such as loaders, dozers, pickups, etc., would produce emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). Hazardous air pollutant emissions would result from the combustion of hydrocarbon fuels, and the handling and use of various chemicals. Diesel fuel combustion emissions contain a number of hazardous air pollutants including benzene, toluene, ethylbenzene, and xylene.

The USEPA's guideline air quality CALPUFF air pollutant dispersion model (referenced in Appendix W of 40 CFR § 51) was used to provide example predictions of potential particulate matter (total suspended particles, PM_{10}, and $PM_{2.5}$) impacts that could result from five vegetation management methods at receptors located between approximately 1 and 100 km (0.6 and 60 miles) from the assumed center of the modeled treatment areas. The

nearest receptors were placed 0.5 km (0.3 miles) from the edge of the modeled treatment area in each case. Both 24-hour and annual impacts were predicted. CALPUFF "lite" version 5.5 was selected because of its ability to screen potential air quality impacts within, as well as beyond, 50 km (30 miles) and its ability to simulate plume trajectory over several hours of transport based on limited meteorological data. In Nevada, sources that were modeled included fire, unpaved roads used by transportation and ignition vehicles, and fugitive dust occurring from pre/post-treatment fuel-break blading (ENSR 2005b).

This modeling is consistent with general modeling practices described in 40 CFR § 51, Appendix W, and with CALPUFF screening procedures outlined by the USEPA. The maximum potential impacts found through modeling for each treatment method are summarized here and more details concerning the modeling are available in the 17-States PEIS and PER (USDOI BLM 2007b, c), and ENSR (2005b).

Beneficial Effects

Carefully planned and implemented restoration treatments that reduce fuel accumulations can reduce the risk of wildfire and smoke effects. Manual methods would be an important treatment option in the wildand urban interface or near other sensitive areas where the use of other treatment methods is limited. Restoration of vegetation in areas that currently consists of bare ground would help to reduce dust emissions.

3.5.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Adverse Effects

For the 17-States PEIS and PER, the BLM modeled concentration estimates of particulate matter for typical, but hypothetical ("example") emission scenarios for each of the treatment methods at six representative locations throughout the western United States (ENSR 2005a, b, USDOI BLM 2007c:4-9). Winnemucca, Nevada, is the closest modeling location to the 3 Bars Project area.

For analysis of air quality impacts in the 17-States PER, it was assumed for manual treatments that the BLM would treat up to 5 acres per day using chainsaws or other hand-held equipment, and would drive to and from the work site. **Table 3-5** shows the modeling results for manual treatments. Total suspended particles, PM_{10}, and $PM_{2.5}$, from manual treatments on the 3 Bars Project area would be negligible and would not exceed ambient air quality standards.

It was assumed that mechanical treatments consisted of 50 acres of mowing and 6 acres of brush blading and piling each day. For prescribed fire, it was assumed that 700 acres were treated each day on 6 separate days with prescribed fire, that the fire began at 9 AM and was extinguished at 6 PM, and that the fuel combustion rate was 50 percent. All treatment scenarios assume that workers and their equipment are transported to the site each day (ENSR 2005b).

Tables 3-6 and **3-7** show the modeling results for mechanical and prescribed fire treatments based on assumptions used in modeling. Modeling indicates that no proposed treatment method would result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. The acreage treated daily would be substantially less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from riparian treatments would be substantially less than those reported in **Tables 3-5** to **3-7** and would be negligible.

Fire treatments could expose bare soil and could lead to particulate matter impacts due to wind-blown dust.

Beneficial Effects

Restoration of riparian, wetland, and spring habitats in areas that currently consists of bare ground would help to reduce dust emissions. Fire treatments would be used on only a few acres annually, if at all, and would help to reduce hazardous fuels and restore natural fire regimes in riparian zones. Carefully planned and implemented prescribed fire should produce far less smoke impact to air quality than uncontrolled wildfires. The BLM would use burn models to determine when to burn during periods with good air dispersion (USDOI BLM 2007c:4-10).

TABLE 3-5

State and National Ambient Air Quality Standards Compliance Analysis for Manual Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration ($\mu g/m^3$)	Background Concentration[1] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	AAQS Standard[2] ($\mu g/m^3$)
Total Suspended Particles	24-hour	3.583E-02	40	40.04	150
	Annual	1.007E-04	11	11.00	50
PM_{10}	24-hour	3.32E-02	30	30.03	150
	Annual	9.16E-05	8	8.00	50
$PM_{2.5}$	24-hour	3.25E-02	30	30.03	35
	Annual	8.92E-05	8	8.00	15

[1] PM_{10} concentrations are also conservatively used as background concentrations for $PM_{2.5}$.
[2] There are no Nevada AAQS for total suspended particles or for annual PM_{10}. Total suspended particles concentrations calculated by multiplying PM_{10} data by 1.33.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
$\mu g/m^3$ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

Aspen Treatments

Adverse Effects

Modeling indicates that no proposed treatment method for any project groups would result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. Only about 15 acres would be treated annually to restore aspen habitat under the proposed action. The acreage treated daily would be substantially less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from aspen treatments would be substantially less than those reported in **Tables 3-5** to **3-7** and would be negligible.

Beneficial Effects

Creating and enhancing fuel breaks in pinyon-juniper stands would break up of the continuity of fuels and moderate fire behavior, and reduce the potential for catastrophic wildfire and the associated smoke impacts. Restoration of aspen and other vegetation in areas that currently consists of bare ground would help to reduce dust emissions.

TABLE 3-6

State and National Ambient Air Quality Standards Compliance Analysis for Mechanical Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration ($\mu g/m^3$)	Background Concentration[1] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	AAQS Standard[2] ($\mu g/m^3$)
Total Suspended Particles	24-hour	3.53E-02	40	40.04	150
	Annual	9.69E-05	11	11.00	50
PM_{10}	24-hour	1.40E-02	30	30.01	150
	Annual	3.84E-05	8	8.00	50
$PM_{2.5}$	24-hour	9.68E-03	30	30.01	35
	Annual	2.65E-05	8	8.00	15

[1, 2] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
$\mu g/m^3$ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

TABLE 3-7

State and National Ambient Air Quality Standards Compliance Analysis for Prescribed Fire Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration ($\mu g/m^3$)	Background Concentration[1] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	AAQS Standard[2] ($\mu g/m^3$)
Total Suspended Particles	24-hour	3.19E-01	40	40.32	150
	Annual	8.85E-04	11	11.00	50
PM_{10}	24-hour	3.19E-01	30	30.32	150
	Annual	8.86E-04	8	8.00	50
$PM_{2.5}$	24-hour	2.91E-01	30	30.29	35
	Annual	8.08E-04	8	8.00	15

[1, 2] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
$\mu g/m^3$ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

Pinyon-juniper Treatments

Adverse Effects

Prescribed fire treatments in pinyon-juniper treatment units could total several thousand acres annually, while wildland fire for resource benefit treatments on the Sulphur Spring Wildfire Management Unit could be used on up to 1,000 acres per treatment. Nonetheless, the adverse impacts from individual prescribed fire treatments would be similar to those modeled (700 acres per day, 4,200 total acres per treatment) and shown in **Table 3-7**.

Modeling indicates that no proposed treatment method would result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. Although many acres would be treated under pinyon-juniper treatments, the acreage treated daily should still be less than the acreage used to model impacts to air quality from treatment methods. Thus, adverse effects on air quality from pinyon-juniper treatments would likely be less than those reported in **Tables 3-5** to **3-7** and would be negligible. Fire treatments could expose bare soil and could lead to particulate matter impacts due to wind-blown dust.

Beneficial Effects

Manual, mechanical, and fire treatments in pinyon-juniper treatment areas would provide several benefits. Creating and enhancing fuel breaks in pinyon-juniper stands would break up of the continuity of fuels and moderate fire behavior, and reduce the potential for catastrophic wildfire and the associated smoke impacts. Thinning and removal of pinyon-juniper in Phase II and III stands should encourage revegetation of bare ground in these stands and reduce dust emissions.

In general, wildfire impacts on air quality would likely be greater than emissions from prescribed burning. Alternative A would have greater long-term benefits than the other alternatives since the proposed treatments are intended to minimize uncontrolled wildfires and reduce the potential for widespread wildfires in future years, with much less potential for widespread dense smoke from these fires to affect nearby receptors. Unlike wildfire, the impacts of smoke from prescribed fire are managed. Where smoke impacts from prescribed fire are of concern, fuel accumulations can be reduced through manual or mechanical treatments prior to, or instead of, prescribed burning. Smoke impacts can also be reduced through scheduling burning for times when the wind is blowing away from smoke-sensitive areas and during good dispersion conditions. Scheduling prescribed burns before new fuels accumulate can reduce the amount of emissions produced. Fire managers can also reduce the amount of area burned, increase the combustion efficiency of a burn, and increase the plume height in order to reduce smoke impacts to air quality (USDOI BLM 2007c:4-10).

The 17-States PER did not analyze the long-term effects on air quality from implementing a vegetation treatment management program similar to that proposed under Alternative A. However, an analysis of a similar vegetation management program in the Interior Columbia Basin showed that effects from wildfire on air quality and visibility could be significantly greater in magnitude than effects from prescribed burning and other treatment methods. As discussed in the 17-States PER, and as shown in the Interior Columbia Basin study, particulate matter emissions associated with prescribed burning and other treatment methods, when considered alone, should not cause widespread regional-scale exceedances of NAAQS. The same would not be true for wildfires. Thus, vegetation treatment actions that improve ecosystem health and reduce hazardous fuels buildup, thereby reducing the risk of wildfire, should provide long-term benefits to local and regional air quality (USDOI BLM 2007c:4-10).

Sagebrush Treatments

Adverse Effects

Modeling indicates that manual, mechanical, and prescribed fire treatments proposed for sagebrush areas would not result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$ (**Tables 3-5** to **3-7**).

Adverse effects on air quality from sagebrush habitat treatments would likely be less than those reported in **Tables 3-5** to **3-7** and would be negligible.

The BLM may use livestock to control cheatgrass and other non-native vegetation and to increase the effectiveness of other treatment methods. Livestock can reduce cheatgrass dominance and can be used to remove some cheatgrass before the unit is treated using other methods and seeded. For air quality modeling, it was assumed that vegetation could be treated using goats or insects (ENSR 2005b). It was also assumed that 10 acres would be treated per day using goats, over a 30-day period, while 100 acres per day would be treated using a hand release of insects. Travel to and from the worksite by workers was assumed under both scenarios. Modeled impacts from biological treatment are listed in **Table 3-8**. Adverse effects on air quality from sagebrush habitat treatments would likely be less than those reported in **Table 3-8** and would be negligible.

Beneficial Effects

Thinning of sagebrush should encourage revegetation of bare ground and reduce dust emissions. Sagebrush treatments would also help to reduce wildfire incidence and associated smoke production. Treatments should lead to improved sagebrush habitat and sagebrush resiliency to fire, and open up the sagebrush canopy to slow fire spread and promote the development of an herbaceous understory that is resistant to fire. Creating and enhancing fuel breaks in sagebrush would break up of the continuity of fuels and moderate fire behavior, and reduce the potential for catastrophic wildfire. At sites dominated by herbaceous or invasive species, such as the Rocky Hills and West Simpson Park units, up to 50 percent of the area could be treated with mechanical methods, and herbicides under existing authorizations. The West Simpson Unit has substantial cheatgrass cover and is in an area rated as high to very high for risk of a catastrophic wildfire. Cheatgrass is quite flammable during the summer, and efforts to eliminate it or slow its spread would help to reduce the risk of wildfire and smoke production.

TABLE 3-8

State and National Ambient Air Quality Standards Compliance Analysis for Biological Treatments

Pollutant	Averaging Period	CALPUFF Lite Concentration ($\mu g/m^3$)	Background Concentration[1] ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	AAQS Standard[2] ($\mu g/m^3$)
Total Suspended Particles	24-hour	7.93E-03	40	40.01	150
	Annual	6.01E-05	11	11.00	50
PM_{10}	24-hour	1.86E-03	30	30.00	150
	Annual	1.42E-05	8	8.00	50
$PM_{2.5}$	24-hour	2.59E-04	30	30.00	35
	Annual	1.98E-06	8	8.00	15

[1, 2] See Table 3-5.
PM_{10} = Particulate matter with aerodynamic diameter of 10 microns or less.
$PM_{2.5}$ = Particulate matter with aerodynamic diameter of 2.5 microns or less.
$\mu g/m^3$ = Micrograms per cubic meter.
AAQS = Ambient Air Quality Standards.
Source: ENSR (2005b).

3.5.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, the BLM would treat approximately half as many acres as under Alternative A, and would not be able to use prescribed fire or wildland fire for resource benefit. This alternative would have fewer particulate emissions and no smoke emissions compared to Alternative A. Modeling indicates that treatments would not result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. Adverse effects on air quality from treatments would likely be less than those reported in **Tables 3-5** to **3-8** and would be negligible.

As about half as many acres would be treated annually to reduce hazardous fuels under this alternative than under Alternative A, there would be more wildfire risk and resultant smoke impacts could be greater under this alternative than Alternative A long term, since wildfires would generate more smoke than a prescribed burn. It is unlikely that the BLM would be able to slow the spread of large infestations of noxious weeds and other invasive non-native vegetation, including cheatgrass, using manual, mechanical, and biological control methods, which would contribute to greater risk for a large-scale wildfire.

Under Alternative B, the BLM would treat fewer acres and conduct fewer treatments in areas with high risk for catastrophic fire than under Alternative A due to the reduction in methods available and increase in costs and time from using manual and mechanical methods. The BLM would be less able to slow pinyon-juniper encroachment and the densification and deterioration in tree health, slow the spread of noxious weeds and other invasive non-native vegetation, and decrease the fire cycle over much of the 3 Bars Project area. Thus, wildfire smoke production and impacts to air quality would be greater under this alternative than under Alternative A.

3.5.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, the BLM would treat approximately one-fourth as many acres as under Alternative A, and would not be able to use mechanical methods, prescribed fire, or wildland fire for resource benefit. This alternative would have fewer particulate emissions than Alternatives A and B. Modeling indicates that treatments would not result in significant air quality impacts. Total concentrations of particulates are virtually unchanged from background levels, and all project-related 24-hour and annual particulate impacts are less than 1 $\mu g/m^3$. Adverse effects on air quality from treatments would likely be less than those reported in **Tables 3-5** to **3-8** and would be negligible.

In addition to the effects discussed under Alternative B, the BLM would not be able to use mechanical methods to slow pinyon-juniper encroachment, create fire and fuel breaks, thin pinyon-juniper and sagebrush, remove downed wood and slash, and remove noxious weeds and other invasive/non-native vegetation. Only about 500 to 1,000 acres would be treated annually to reduce hazardous fuels, so it is unlikely the trend toward large-sized fires of moderate to high severity in sagebrush and large stand-replacing fires in pinyon-juniper would slow or reverse long term. Thus, there would be more wildfire risk and resultant smoke impacts under Alternative C than Alternatives A and B. Because of the heightened risk of wildfire, adverse effects to air quality would be greater under this alternative than under Alternatives A and B.

3.5.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct or indirect impacts to air quality from this alternative as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation, especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. Thus, the 3

Bars Project area would be subject to large scale wildfires with potentially uncontrolled dense smoke emissions from these fires and air quality impacts from wildfires would likely be greater under Alternative D than under the action alternatives.

3.5.3.4 Cumulative Effects

The CESA for air quality is approximately 1,524,879 acres and generally follows the boundary developed for soil, water, and vegetation resources (all or portions of Hydrologic Unit Code 10 watersheds within the 3 Bars Project area), but also includes additional area to the northwest of the 3 Bars Project area (**Figure 3-1**). This boundary was developed by BLM fire management staff and based on their observations of where smoke from prescribed and wildland fires on the project area drifts, their interactions with federal and state agencies responsible for air quality, and their knowledge of dominant weather patterns in the project area. Approximately 92 percent of the CESA is administered by the BLM, 6 percent is privately owned, and 2 percent is administered by the Forest Service.

3.5.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Cumulative impacts to air quality could result from the emissions from a number of sources within the CESA that are associated with reasonably foreseeable land development and utility and infrastructure projects. Mechanical equipment would be used during construction of utility and infrastructure projects, and construction workers and users of the facilities would travel by vehicle to project sites. Technology, however, will continue to play an important role in reducing air emissions from engine operations.

The BLM could continue use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments could contribute particulate matter and chemicals associated with the herbicides to the atmosphere, but these effects on air quality would be localized and negligible. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites on a few hundred acres annually.

Population growth in Eureka County would lead to additional land development, and construction and use of businesses, homes, and related infrastructure and associated production of pollutants. Air quality impacts could result from generation of fugitive dust and from the burning of fossil fuels. Some of these emissions would be localized and subject to air quality permits.

The 8,300 acre Mount Hope Project, under construction in the southeastern portion of the 3 Bars Project area, would be a large contributor of dust and other pollutants in the CESA. Emissions of PM_{10}, $PM_{2.5}$, and lead would be generated by numerous processes as a result of the mine project, including the resuspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the processing of ore materials. Combustion of diesel in the haul trucks and mobile equipment, such as loaders, dozers, etc., the combustion of propane in processing units such as boilers, and the combustion of fuel oil or diesel in units such as the roaster, can produce elevated ambient levels of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). Modeling done for the Mount Hope Project and Ruby Hill Mine showed that these emissions, however, would not exceed the Nevada State AAQS or national AAQS, even with the addition of the background values.

Short-term adverse and long-term beneficial effects from 3 Bars Project treatments would accumulate with those outside the project area. Fuels reduction and habitat improvement projects would occur on about 1 percent of the CESA annually (about 12,700 acres within the 3 Bars Project area, and about 1,500 acres within the remainder of the CESA) to reduce hazardous fuels and restore ecosystem health. Treatments would impact air quality, as discussed under direct and indirect effects, but the effects on air quality would be negligible. Treatments should help to reduce the risk of wildfire. Based on long-term averages, approximately 6,900 acres would burn annually from wildfires in the CESA. In general, air quality impacts from wildfires would be greater than air quality impacts from prescribed fire on a per acre basis.

3.5.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. Under Alternative B, the BLM would treat approximately 6,300 acres annually within the 3 Bars Project area, and the short-term adverse and long-term beneficial effects from 3 Bars Project treatments would accumulate with those from treatments (about 1,500 acres annually) elsewhere in the CESA. The amount of pollutants generated under Alternative B would be less than half those generated under Alternative A, due to fewer acres being treated and lack of use of prescribed fire and wildland fire for resource benefit. Pollutants generated from 3 Bars Project treatments would be low in the context of emissions from other sources in the CESA, and cumulatively would not result in an exceedance of Nevada AAQS or national AAQS. Treatments would help to reduce the risk of wildfire within the CESA, and resultant smoke emissions, but not to extent as would occur under Alternative A.

3.5.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. Under Alternative C, the BLM would treat about 3,200 acres annually on the 3 Bars Project area, and another 1,500 acres on other public lands within the CESA. Because of the limited number of acres treated, and lack of use of mechanical equipment and fire, particulate and air emissions would be less under this alternative than the other action alternatives. Pollutants generated from 3 Bars Project treatments would be negligible in the context of emissions from other sources in the CESA, and cumulatively would not result in an exceedance of Nevada AAQS or national AAQS. Treatments would help to reduce the risk of wildfire within the CESA, and resultant smoke emissions, but not to extent as would occur under Alternatives A and B.

3.5.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

Under Alternative D, effects from non-3 Bars Project reasonably foreseeable future actions on air quality would be similar to those described under Alternative A. There would be no cumulative effects to air quality from this alternative as no treatments would be authorized under this alternative. This alternative would not reduce the risk of wildfire, thus air quality effects from wildfire within the CESA would likely be highest under this alternative.

3.5.3.5 Unavoidable Adverse Effects

Use of prescribed fires would result in smoke emissions that contain particulates and gaseous constituents (i.e., PM_{10}, $PM_{2.5}$, CO, and hazardous air pollutants). Emissions of PM_{10} and $PM_{2.5}$, and gaseous materials, would be generated by numerous processes as a result of the proposed action, including the re-suspension of road dust, wind erosion of exposed dirt surfaces, and activities related to the treatment methods. Combustion of diesel in trucks and

mobile equipment, such as loaders, dozers, pickups, etc., can produce emissions of CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and O_3 (from volatile organic compound emissions). These activities are inherent to the operational activities and would be ongoing throughout the life of the 3 Bars Project.

3.5.3.6 Relationship between the Local Short-term Uses and Maintenance and Enhancement of Long-term Productivity

Vegetation treatments would cause short-term degradation of air quality, with most degradation associated with fire use. As discussed earlier, much of the focus of treatments is on restoring ecosystem function including natural fire regimes and reducing the incidence and severity of wildfires. In general, wildfire impacts on air quality would likely be greater than emissions from prescribed burning, since techniques to minimize emissions would be implemented during prescribed burns and smoke management plans would permit prescribed fires only when meteorological conditions are favorable to smoke dispersion.

In addition, state smoke management meteorologists would consider the cumulative effects of emissions from other sources (such as road dust, other federal vegetation management activities, and agricultural dust and burning) during the development of daily smoke management instructions. State smoke management program managers would also consider these sources during development of smoke management plans submitted for approval (as a component of the state smoke implementation plan) to the USEPA (USDOI BLM 2007b:4-246).

3.5.3.7 Irreversible and Irretrievable Commitment of Resources

Air quality would be affected by all treatment methods, with fire use contributing the most to degradation of air quality. These effects would occur only during the period of the treatment activity and there would be no irreversible or irretrievable effects on air quality.

3.5.3.8 Significance of the Effects under the Alternatives

There would be negligible direct, indirect, and cumulative effects to air quality from 3 Bars Project actions under all alternatives. The treatment methods under each action alternative would not result in significant direct, indirect, or cumulative impacts on air quality in the 3 Bars Project area or CESA since:

- There would be no violation of any regulatory requirement of the Nevada BAPC.
- No state or federal AAQS would be violated.
- Treatments would not contribute substantially to an existing or projected air quality violation.
- No sensitive receptors would be exposed to substantial pollutant concentrations.

3.5.4 Mitigation

No mitigation measures are proposed for air quality.

3.6 Geology and Minerals

3.6.1 Regulatory Framework

3.6.1.1 Geological Resources

Regulations pertaining to geological resources are concerned with either the preservation of unique geological features or with designing structures or infrastructure to mitigate geological hazards such as earthquakes and landslides. Unique geological features are protected as National Natural Landmarks. The National Registry of Natural Landmarks (16 USC §§ 461 to 467) set up the National Natural Landmarks program in 1962, which is administered under the Historic Sites Act of 1935.

3.6.1.2 Mineral Resources

Most of the mineral estate in the 3 Bars Project area is administered by the federal government. Publicly owned minerals are available for exploration, development, and production, while subject to existing regulations, standard terms and conditions, and stipulations. Federally administered minerals in the public domain are classified into specific categories and these categories only apply to minerals in the federal mineral estate. These categories are locatable, leasable, and salable minerals.

Locatable minerals include precious and base metallic ores and nonmetallic minerals such as bentonite, gypsum, chemical grade limestone, and chemical grade silica sand. Uncommon varieties of sand, gravel, building stone, pumice, rock, and cinders are also managed as locatable minerals. Locatable minerals are acquired by a company or individual under the General Mining Law of 1872, as amended, and Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute1997). The BLM has been charged by the U.S. Congress with the management of activities on public lands under the General Mining Law of 1872.

A mining claim gives the holder the right to mine on federal land, while a patent gives the holder outright ownership of mineral-rich land that belongs to the federal government. An individual or company must first possess a claim before applying for a patent. The Mining Law of 1872 and amendments have provided a process for the filing of mining claims and assessment of fees to facilitate the exploration and development of valuable minerals as described above. Ultimately, claims could be patentable whereby the government would assign title of the claim to an individual or entity and the claim becomes private land. However, since 1994, the BLM has not been able to accept patent applications under a moratorium instituted by various acts of Congress.

Leasable minerals are those minerals that are leased to individuals for exploration and development. The leasable minerals have been subdivided into two classes, fluids and solid. Fluid minerals include oil and gas, geothermal resources and associated by-products, and oil shale, native asphalt, oil impregnated sands, and any other material in which oil is recoverable only by special treatment after the deposit is mined or quarried. Solid leasable minerals are specific minerals such as coal and phosphates. These minerals are associated with the following laws: the Mineral Leasing Act of 1920, as amended and supplemented, the Mineral Leasing Act for Acquired Lands of 1947, as amended, and the Geothermal Steam Act of 1970, as amended (American Geological Institute 1997). Leasable minerals are acquired by applying to the federal government for a lease to explore and develop the minerals.

Salable minerals are all other common mineral materials that were not designated as leasable or locatable, and include sand, gravel, roadbed, ballast, and common clay. These are sold by contract with the federal government. These

minerals are regulated under the Mineral Material Act of July 23, 1947, as amended, and the Surface Use and Occupancy Act of July 23, 1955 (American Geological Institute 1997).

3.6.2 Affected Environment

3.6.2.1 Study Methods and Study Area

Information on the geology and mineral resources of the 3 Bars Project area was derived from maps and publications by the Nevada Bureau of Mines and Geology, the U.S. Geological Survey (USGS), and Mount Hope Project EIS and references cited therein (USDOI BLM 2012c). The study area for direct, indirect, and cumulative effects to geology and minerals is the 3 Bars Project area.

3.6.2.2 Geology

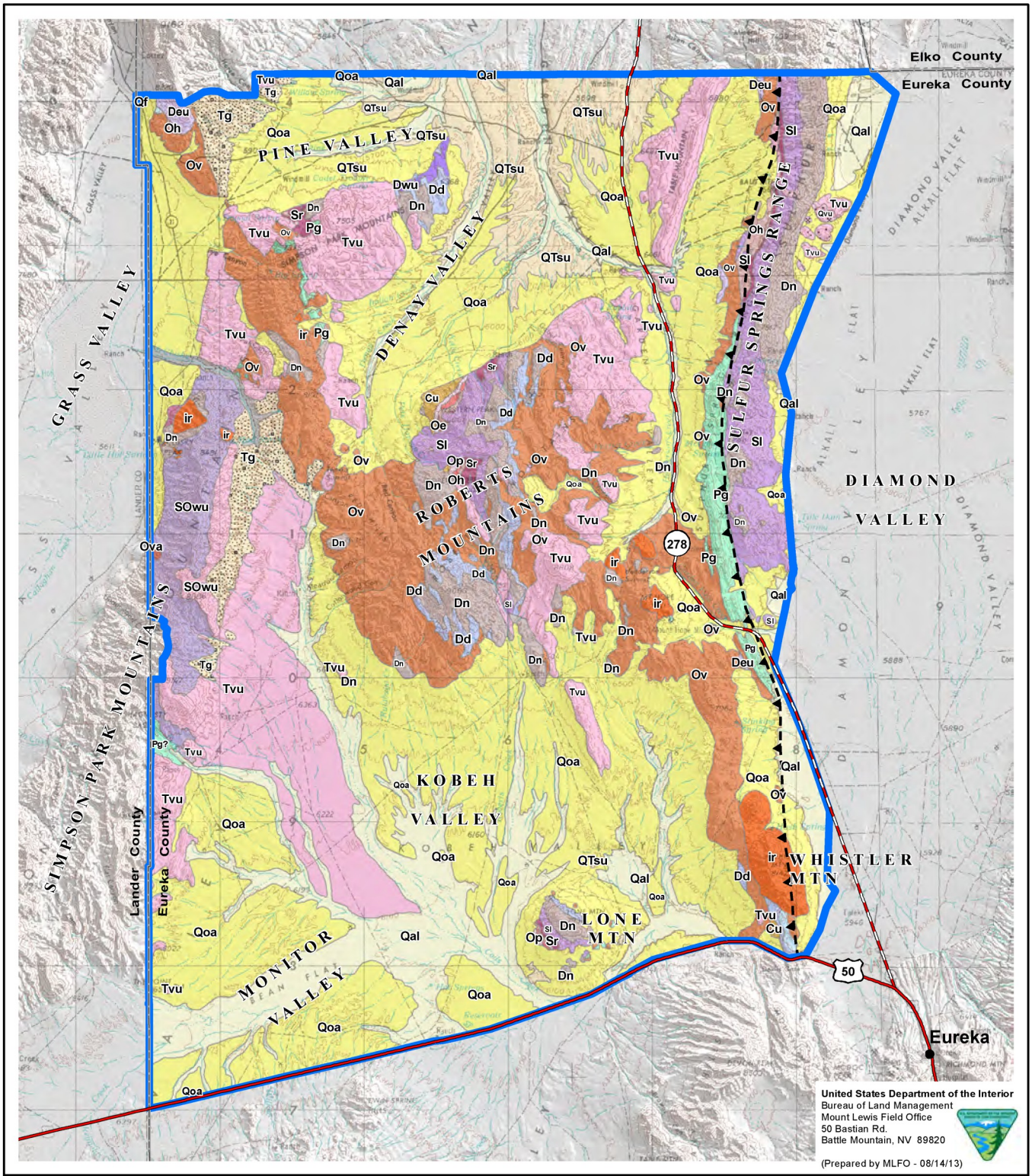
The following is a general description of the geology of the study area. A more detailed description is in the Mount Hope Final Project EIS (USDOI BLM 2012c).

The study area is located along the leading edge of the Roberts Mountains thrust. The Roberts Mountains thrust was formed when a mix of sedimentary and volcanic rock (the "Western" assemblage) was thrust on top of similarly aged carbonate rocks (the "Eastern" assemblage) about 340 to 370 million years ago, during the Devonian-Mississippian Antler orogeny, or process of mountain building (Roberts et al. 1967). The Western assemblage includes the Vinini and Valmy formations, which are largely composed of mudstones, cherts, sandy limestones, sandstones, and conglomerates and are exposed on the Roberts Mountains and the Simpson Park Mountains (**Figure 3-9**). The Western assemblage also contains minor amounts of limestone and andesitic volcanic rocks.

Eastern assemblage rocks, including the Silurian Lone Mountain Dolomite and Devonian Nevada Formation, are exposed along the eastern side of the Sulphur Spring Range and in the Fish Creek Range on the southeastern corner of the study area (Roberts et al. 1967). The Eastern assemblage in Eureka County is composed of Cambrian to Ordovician rocks that were originally deposited in a shallow water shelf, and consist primarily of limestone, dolomite, and lesser amounts shale and quartzite.

During the Antler orogeny, an elongate foreland basin formed at the toe of the mass of rock that had been moved. This basin was filled with a post-orogenic coarse clastic (rocks that are derived from fragments of other rocks due to erosion and weathering and then the rock fragments are transported and deposited to form new rocks; this is a class of sedimentary rocks) "Overlap" assemblage representing detritus eroded off the Antler highlands. Intermittent orogenic movement during the late Paleozoic and Mesozoic resulted in folding and thrust faulting of the Overlap assemblage and underlying formations.

In addition to the Paleozoic rocks that belong to the assemblages described above, Tertiary volcanic and intrusive rocks are present. The volcanic rocks are exposed in the Simpson Park Mountains and Roberts Mountains and are composed of flows and tuffs. Igneous intrusive rocks are associated with the Mount Hope igneous complex (Roberts et al. 1967, USDOI BLM 2012c).



Roberts Mountains Thrust

- Qal-Alluvium
- Qa-Valley Alluvium and Stream Deposits
- Qf-Alluvial Fan Deposits
- Qs-Sinter Deposits
- Qoa-Older Alluvium
- Qvu-Volcanic Rocks, Undivided
- QTsu-Sedimentary Deposits, Undivided
- Tg-Gravels
- Tvu-Volcanic Rocks, Undivided
- ir-Intrusive Rocks
- Kn-Newark Canyon Formation
- Pg-Garden Valley Formation
- Mu-Sedimentary Rocks, Undivided
- Dd-Devils Gate Limestone
- Dwu-Sedimentary Rocks, Undivided
- Deu-Sedimentary Rocks, Undivided
- Dn-Nevada Formation
- DSwu-Sedimentary Rocks, Undivided
- Sl-Lone Mountain Dolomite
- Sr-Roberts Mountains Formation
- SOwu-Sedimentary Rocks, Undivided
- Oh-Hanson Creek Formation
- Ova-Valmy Formation
- Ov-Vinini Formation
- Oe-Eureka Quartzite
- Ou-Sedimentary Rocks, Undivided
- Op-Pogonip Group
- Cu-Sedimentary Rocks, Undivided
- Undetermined
- 3 Bars Project Area

Source: Roberts et al. 1967.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-9

Geologic Formations

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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Original data were compiled from various sources. This information may not meet National Map Accuracy Standards.
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3.6.2.3 Minerals

3.6.2.3.1 Locatable Minerals

The most important locatable mineral commodities in the study area are precious and base metal resources including antimony, gold, lead, manganese, mercury, molybdenum, nickel, silver, vanadium, and zinc (Roberts et al. 1967). The Eureka-Battle Mountain trend crosses the study area from northwest to southeast and mines within the trend produced over 100,000 ounces of gold in 2009 (Price et al. 2010).

Major mines in Eureka County include the Betze-Post Mine (Barrick Goldstrike Mines, Inc.), Eastern Nevada Operations (Newmont Mining Corporation), and the Ruby Hill Mine (Barrick Gold Corp.), which have produced a total of 81,382 ounces of gold and 43,276 ounces of silver through 2010 (Driesner and Coyner 2011). The Mount Hope Project is under construction, and there are several historical mining districts within the study area including the Roberts, Antelope, Lone Mountain, and Mount Hope Districts (**Figure 3-10**; Roberts et al. 1967).

A Record of Decision for the Mount Hope Project was issued in 2012 and construction for the project is underway, with operations scheduled to start in 2014 (USDOI BLM 2012c). Molybdenum was discovered at the site through exploratory drilling in the 1970s and 1980s (General Moly 2012) and the deposit is estimated to have 1.3 billion pounds of molybdenum reserves.

3.6.2.3.2 Leasable Minerals

Oil and Gas

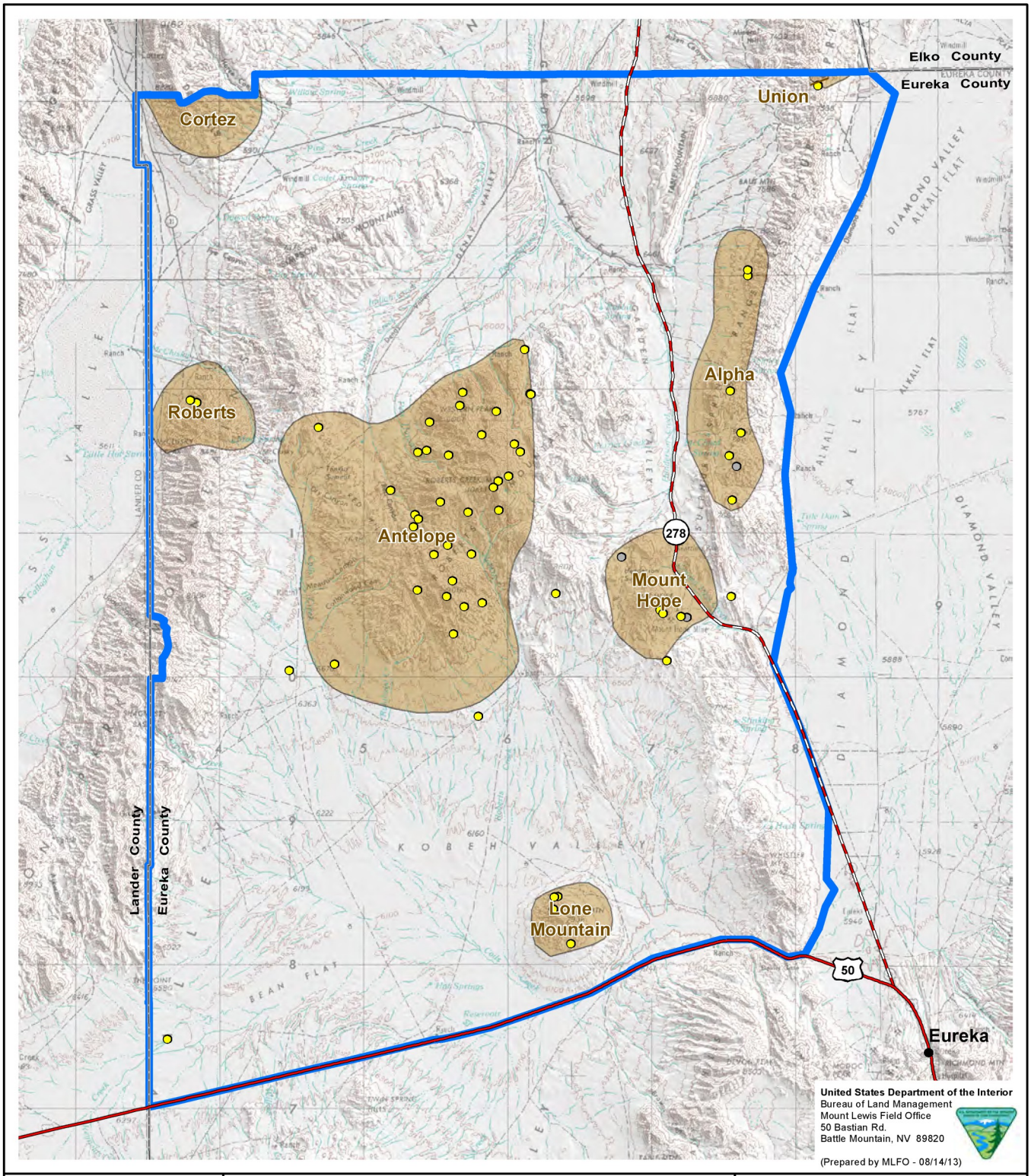
A few oil and gas test holes have been drilled in the study area, but no commercial production has been established (**Figure 3-11**; Garside and Hess 2011). Pine Valley is considered an area of high petroleum potential and a small portion of the southern part of the valley extends into the project area.

Geothermal

Geothermal energy is a potential leasable mineral resource in the study area. Geothermal energy is used for power generation at Beowawe, Nevada, in northern Eureka County, and at the McGinness Hills geothermal project in Grass Valley, Lander County, and west of the 3 Bars Project area. The likelihood of geothermal development on the 3 Bars Project area is low (Zehner et al. 2009).

3.6.2.3.3 Saleable Minerals

Alluvial fan deposits along the mountain fronts in Eureka County provide a large potential source of sand and gravel (Lumos and Associates 2007). There are about 24 saleable minerals sites covering about 55 acres within the 3 Bars Project area. Annual production is about 100,000 tons of material.



Legend

Mineral Resources

- Precious Metals
- Base Metals
- Mining District
- 3 Bars Project Area

Source: Lumos & Associates 2007.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-10

Mineral Resources

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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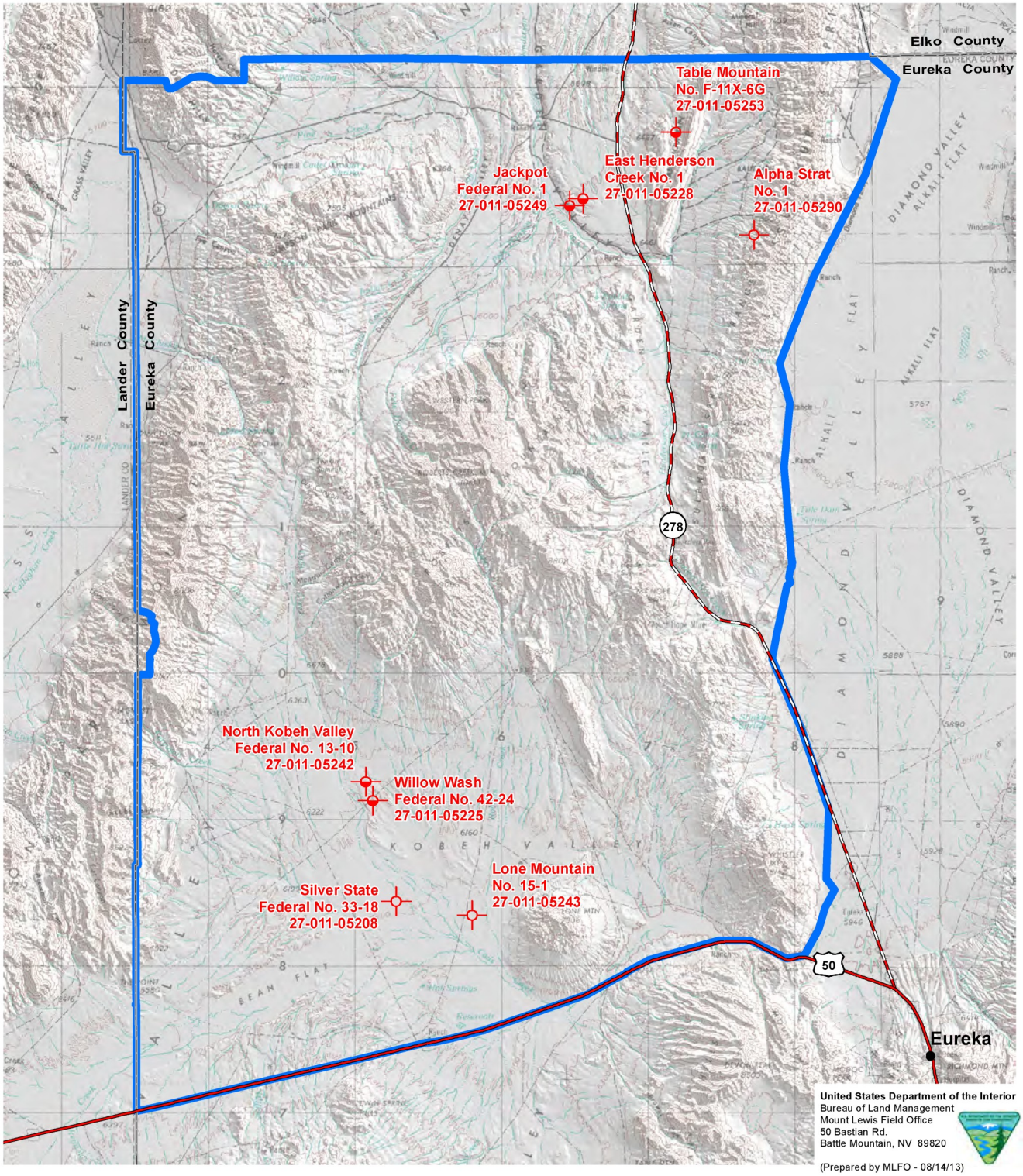

Legend

- Abandoned Well with Evidence of Oil and/or Gas Encountered while Drilling
- Abandoned Well with No Evidence of Oil or Gas Encountered while Drilling
- 3 Bars Project Area

Source: Garside & Hess 2007.

3 Bars Ecosystem and Landscape Restoration Project

Figure 3-11

Oil and Gas Resources (through 2006)

0 1 2 3 4 5 10 Miles

0 1 2 3 4 5 10 Kilometers

N

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3.6.3 Environmental Consequences

3.6.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, key issues of concern for geology and minerals are the potential for restoration treatments to interfere with existing or proposed mineral extraction operations and the ability to access the underlying minerals.

3.6.3.2 Significance Criteria

Effects to geology or minerals would be considered significant if BLM actions resulted in a prolonged or permanent restriction on use of, or access to, mineral resources.

3.6.3.3 Direct and Indirect Effects

3.6.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

There is potential that restoration treatments could affect or be effected by mineral exploration and development, as an area could be restored and later affected by mineral exploration or development that could cause the loss of restoration benefits; or restoration treatments could interfere with staking and maintenance of mineral claims. Conflicts (and subsequent potential effects) between mineral exploration and development and land restoration would be minimized by the implementation of General Standard Operating Procedure 4 (**Appendix C**), whereby the location of mineral claims and other mineral activity would be determined prior to the start of treatments. By reviewing the LR 2000 database, the BLM would be able to identify areas with current and possibly future mineral activity, such as current fluid minerals leases. The presence of mining claims or fluid mineral leases would not preclude restoration work, but these sites would require more coordination with affected interests.

Restoration treatments would not be expected to interfere with current ongoing mineral extraction operations. However, areas disturbed by ongoing mineral development (leach pads, waste rock dumps, roads, and mine facilities) would be precluded from treatment, as restoration of these areas would be handled under federal mining laws and Nevada State regulations. Eventual reclamation of these areas would be consistent with BLM land management goals and objectives.

3.6.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

The use of minerals would be greater for riparian treatments than for other treatment types. Gravel and crushed rock resources would be needed for streambank restoration and grade stabilization. This effect on local gravel and rock resources would be negligible as valley fill deposits provide an abundance of gravel and rock resources, but the BLM may have to develop pits near Roberts Mountains and other treatment areas to provide mineral resources. Riparian treatments would have little effect on mineral access or potential for conflict with mineral exploration and development because of the limited extent of the riparian treatment areas.

Aspen Treatments

Aspen treatments would have no effect on mineral use because aspen treatments do not involve the use of gravel or crushed rock. Aspen treatments would have little effect on mineral access or potential for conflict with mineral exploration and development because of the limited extent of the aspen treatment areas.

Pinyon-juniper Treatments

Pinyon-juniper treatments would have no effect on mineral use because pinyon-juniper treatments would not involve the use of gravel or crushed rock. Pinyon-juniper treatments could affect mineral access and contribute to potential conflicts with mineral exploration and development because of the large area being treated to control pinyon-juniper and the potential for treatment areas to overlap with future mineral resource development areas.

Sagebrush Treatments

Sagebrush treatments would have no effect on mineral use because sagebrush treatments would not involve the use of gravel or crushed rock. Sagebrush treatments would have little effect on mineral access or potential conflicts for conflict with mineral exploration and development because of the limited area being treated and the limited potential for treatment areas to overlap with mineral resource areas.

3.6.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

Direct and indirect effects to local gravel and rock resources under Alternative B would be similar to those for Alternative A. Potential conflicts over access to and use of mineral resources would be about 50 percent less under this alternative than under Alternative A.

3.6.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

Direct and indirect effects to local gravel and rock resources under Alternative C would be about one-fourth those for Alternative A. Potential conflicts over access to and use of mineral resources would one-fourth that of Alternative A.

3.6.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to geology and minerals from this alternative as no treatments would be authorized under this alternative.

3.6.3.4 Cumulative Effects

The CESA for geology and mineral resources is the 3 Bars Project area (**Figure 3-1**).

3.6.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Alternative A would have a negligible contribution to the cumulative effects on mineral resources. About 12,700 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore riparian, aspen, pinyon-juniper, and sagebrush habitat and reduce hazardous fuels. Approximately 31 miles of stream would be restored, and restoration activities would require gravel and crushed rock. However, in the context of road and other land development and mining within the CESA, gravel and crushed rock

needs for the 3 Bars Project would be negligible. Potential conflicts over access to and use of mineral resources would also be negligible.

3.6.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Alternative B would have a negligible contribution to the cumulative effects on mineral resources. About 6,300 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore habitat and reduce hazardous fuels. Approximately 31 miles of stream would be restored, and restoration activities would require gravel and crushed rock. However, in the context of road and other land development and mining within the CESA, gravel and crushed rock needs for the 3 Bars Project would be negligible. Potential conflicts over access to and use of mineral resources would also be negligible.

3.6.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Alternative C would have a negligible contribution to the cumulative effects on mineral resources. About 3,200 acres would be treated annually on the 3 Bars Project area, and another 1,500 acres annually on other public lands within the CESA, to restore habitat and reduce hazardous fuels. Only about 8 miles of stream would be restored, one-fourth the miles of stream restored under Alternatives A and B. In the context of road and other land development and mining within the CESA, gravel and crushed rock needs for the 3 Bars Project would be negligible, as less than 1 percent of the CESA would be affected annually. Potential conflicts over access to and use of mineral resources would be negligible.

3.6.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

There would be no cumulative impacts to geology and mineral resources from this alternative as no treatments would be authorized under this alternative.

3.6.3.5 Unavoidable Adverse Effects

There would be a loss of gravel and rock from mine quarries for stream bioengineering activities under Alternatives A, B, and C.

3.6.3.6 Relationship between Local Short-term Uses and Long-term Productivity

There would be a long-term loss of mineral resources from quarries to provide gravel and rock resources for stream bioengineering. However, these resources would have a long-term benefit to riparian and stream habitat.

3.6.3.7 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of geological or mineral resources. Gravel and rock used for stream bioengineering would be moved from one location (mine quarry) to another (stream), but not lost.

3.6.3.8 Significance of the Effects under the Alternatives

There would be negligible direct, indirect, and cumulative effects to geology or mineral resources from the alternatives and these effects would not be significant. Demand for gravel and crushed stone to support mining activities in the CESA would far exceed the amounts of material that would be needed for 3 Bars Project treatments.

None of the alternatives are expected to result in a prolonged or permanent restriction on use of or access to mineral resources within the 3 Bars Project area or CESA.

3.6.4 Mitigation

No mitigation measures are proposed for geology or minerals.

3.7 Paleontological Resources

3.7.1 Regulatory Framework

Federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (Public Law-59-209; 16 United States Code [USC] § 431 et seq; 34 Statute 225), which calls for protection of historic and prehistoric structures and other objects of historic or scientific interests on federally administered lands. Federal protection for scientifically important paleontological resources would apply to construction or other related project impacts that occur on federally administered lands.

The Paleontological Resource Protection Act of 2009 (Public Law 111-011) requires the Secretaries of the Department of Interior and Department of Agriculture to manage and protect paleontological resources on federal land using scientific principles and expertise. The Act includes specific provisions addressing management of these resources by the BLM and other federal agencies.

The BLM manages paleontological resources under a number of other federal laws including the Federal Land Policy and Management Act (Sections 310 and 302[b]), which directs the BLM to manage public lands to protect the quality of scientific and other values; 43 CFR § 8365:1-5, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects; 43 CFR § 3622, which regulates the amount of petrified wood that can be collected for personal noncommercial purposes without a permit; and 43 CFR § 3809.420 (b)(8), which stipulates that a mining operator "shall not knowingly disturb, alter, injure, or destroy any scientifically important paleontological remains or any historical or archaeological site, structure, building or object on federal lands."

The BLM has adopted the Potential Fossil Yield Classification (PFYC) system to identify and classify fossil resources on federal lands (**Table 3-9**; USDOI BLM 2007e). Paleontological resources are closely tied to the geologic units (i.e., formations, members, or beds) that contain them. The probability of finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Therefore, geologic mapping can be used for assessing the potential for the occurrence of paleontological resources.

The PFYC system is a way of classifying geologic units based on the relative abundance of vertebrate or scientifically significant fossils (plants, vertebrates, and invertebrates) and their sensitivity to adverse impacts. A higher class number indicates higher potential for presence. The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class. Instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment.

The PFYC system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources. The classification should be considered at an intermediate point in the analysis, and should be used to assist

in determining the need for further mitigation assessment or actions. The BLM intends for the PFYC System to be used as a guideline rather than as a rigorous definition.

In addition to the statutes and regulations previously listed, fossils on public lands are managed through the use of internal BLM guidance and manuals. Included among these are BLM Manual 8270, *Paleontological Resource Management*, and BLM Handbook H-8270-1, *General Procedural Guidance for Paleontological Resource Management* (USDOI BLM 2008c, d).

TABLE 3-9

Potential Fossil Yield Classification

Class	Description	Basis
1	Igneous and metamorphic (tuffs are excluded from this category) geologic units or units representing heavily disturbed preservation environments that are not likely to contain recognizable fossil remains.	• Fossils of any kind known not to occur except in the rarest of circumstances. • Igneous or metamorphic origin. • Landslides and glacial deposits.
2	Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant invertebrate fossils.	• Vertebrate fossils known to occur very rarely or not at all. • Age greater than Devonian. • Age younger than 10,000 years before present. • Deep marine origin. • Aeolian origin. • Diagenetic alteration.
3	Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Also sedimentary units of unknown fossil potential.	• Units with sporadic known occurrences of vertebrate fossils. • Vertebrate fossils and significant invertebrate fossils known to occur inconsistently, and predictability known to be low. • Poorly studied and/or poorly documented. Potential yield cannot be assigned without ground reconnaissance.
4	Class 4 geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.	• Significant soil/vegetative cover; outcrop is not likely to be impacted. • Areas of any exposed outcrop are smaller than 2 contiguous acres. • Outcrop forms cliffs of sufficient height and slope that most is out of reach by normal means. • Other characteristics that lower the vulnerability of both known and unidentified fossil localities.
5	Highly fossiliferous geologic units that regularly and predictably produce invertebrate fossils and/or scientifically significant invertebrate fossils, and that are at risk of natural degradation and/or human-caused adverse impacts.	• Vertebrate fossils and/or scientifically significant invertebrate fossils are known and documented to occur consistently, predictably, and/or abundantly. • Unit is exposed and little or no soil/vegetative cover. • Outcrop areas are extensive and discontinuous areas are larger than 2 contiguous acres. • Outcrop erodes readily and may form badlands. • Easy access to extensive outcrop in remote areas. • Other characteristics that increase the sensitivity of both known and unidentified fossil localities.

Sources: USDOI BLM (2007e, 2008c).

3.7.2 Affected Environment

3.7.2.1 Study Methods and Study Area

Information on the paleontological resources of the 3 Bars Project area was derived from maps and publications by the Nevada Bureau of Mines and Geology and USGS, and the Mount Hope Project EIS and references cited therein (USDOI BLM 2012c).

The study area for direct, indirect, and cumulative effects to paleontological resources is the 3 Bars Project area (**Figure 3-1**).

3.7.2.2 Fossil Potential in the Study Area

No paleontological resources of critical scientific or educational value are known to occur within the 3 Bars Project area. Paleontological resources have been identified in several mountain ranges in the study area (Lumos and Associates 2007, USDOI BLM 2012c). At Roberts Mountains and Lone Mountain, the paleontological resources are associated with Ordovician rocks where the fossil assemblages provide evidence of mass extinctions. The Simpson Park Mountains and Roberts Mountains have yielded marine vertebrate fossils from Devonian rocks. The fossil-bearing formations have not been classified according to the PFYC system.

At Roberts Mountains, paleontological resources have been found near Vinini Creek, Pete Hanson Creek, and Cottonwood Canyon, and are significant for their invertebrate fossil resources because they have yielded numerous new species. Johnson (1962) reports a previously unrecorded species of brachiopod, leading to the designation of a new Middle Devonian zone from rocks in the Roberts Mountains. Ausich (1978) reports a new species of *Pisocrinus* from the Roberts Mountains which expanded the known range for this type of Silurian crinoid. Stone and Berdan (1984), based on investigations of the Late Silurian strata of the Roberts Mountains, identified 3 new genera and 18 new species of ostracodes.

3.7.3 Environmental Consequences

3.7.3.1 Key Issues of Concern Considered during Evaluation of the Environmental Consequences

Based on the AECC and public scoping comments, no key issues of concern were identified for paleontological resources. However, the BLM is obligated by statute to protect paleontological resources on federal lands from damage by activities initiated or approved of by the BLM.

3.7.3.2 Significance Criteria

The loss or destruction of scientifically important or valuable paleontological resources would constitute a significant impact.

3.7.3.3 Direct and Indirect Effects

3.7.3.3.1 Direct and Indirect Effects Common to All Action Alternatives

Paleontological resources are most valuable when they are found in place and undisturbed. Even if fossils are present "in float," on the soil surface or as part of soil horizons, if they are not found in their original stratigraphic position in the sedimentary layers they are less valuable scientifically.

Restoration treatments should have little or no impact on paleontological resources. Scientifically valuable fossils that may be present in the study area would be in bedrock outcrops and should not be affected. Indirect adverse effects to paleontological resources could occur through unauthorized collecting by workers at easily accessible outcrops.

3.7.3.3.2 Direct and Indirect Effects under Alternative A (Preferred Alternative)

Riparian Treatments

Mechanical treatments involving the use of heavy equipment, and any treatment method that has the potential to disturb more than surficial layers (disturbance greater than 6 to 8 inches deep), or has the potential to disturb bedrock, have the greatest possibility of causing impacts to paleontological resources. Equipment with treads (i.e., bulldozers with grousers) could damage fossil specimens contained in float, but such action would not have as much impact as disturbance of fossils that are contained in bedrock and outcrop. If the disturbance is shallow, and not on exposed bedrock, the potential for loss or damage of fossils would be minimal. However, soil excavation and removal would only occur on a few acres annually within riparian zones, and mostly in areas that have likely been disturbed in the past by stream channelization and movement, so impacts to fossils from riparian zone treatments should be negligible.

The effects of fire on fossil resources have been studied by the National Park Service. A study was conducted in the Badlands National Park, South Dakota, where the effects of elevated temperatures on fossils were studied in controlled burns and under laboratory conditions (Benton and Reardon 2006). They found that moderate fire conditions appear to have "minimal impact on fossil resources" unless the specimens are in direct contact with burning fuel. It was found that high intensity fire conditions could have an effect on fossils even if there is no contact with burning fuel. Fossils exposed to low intensity fire conditions showed no alteration while fossils exposed to higher temperatures exhibited discoloration and fracturing. Since the most valuable fossil resources are still entrained in outcrops where there is less likelihood for fuel, and only a few acres of riparian habitat would be burned annually, the risk of impacts to fossil resources from prescribed fire on the 3 Bars Project area would be negligible.

Aspen Treatments

Mechanical treatments would generally involve the manipulation of vegetation above the soil surface. Aspen treatments presents a lesser risk of potential effects to fossils than riparian treatments, because mechanical treatments would not disturb the soil as deeply as would stream restoration treatments, and fire treatments would be small in size and primarily limited to aspen stands.

Pinyon-juniper Treatments

Manual treatments would primarily occur in Phase I and II woodland stands (see Section 3.11.2, Native and Non-invasive Vegetation Resources, for a discussion of pinyon-juniper phase classes) found at lower elevations and would be unlikely to disturb fossils.

Bulldozers pulling Ely chains within Phase II and III stands could expose fossils and impact their integrity. However, the risk to fossils from chaining would be very low, as typically bulldozers are limited in their reach due to steepness of terrain, and the BLM would try to avoid impacting any rock outcrops with the chain.

Because the BLM proposes to use prescribed fire primarily in Phase III stands that are often found at higher elevations, it is possible that fires would come into contact with rock outcrops that might contain fossils. These include treatments in the Atlas, Frazier Unit, Henderson Corridor, Gable Corridor, and Vinini Corridor units, which are on Roberts Mountains where fossils have been found. Paleontological resources have been found near Vinini Creek, Pete Hanson Creek, and Cottonwood Canyon. Rock outcrops are also associated with old-growth pinyon-juniper and limber pine, but the BLM has no plans to conduct fire treatments in old-growth areas.

Sagebrush Treatments

The BLM would use a roller chopper, rangeland mower, or smooth chain to open up sagebrush stands, but these treatments would create little disturbance to the soil and rock outcrops would be avoided. The BLM proposes to use prescribed fire on a few acres annually in the Three Corners Unit. No fossils have been identified in this unit, and due to the limited acres treated using fire, risks to fossils would be negligible even if they are present.

The BLM also proposes to treat cheatgrass and other non-native vegetation at the Rocky Hills, Table Mountain, West Simpson Park, and Whistler Sage units using all treatment methods. No fossils have been found in these areas, and if present, would be found below the soil surface and should not be affected by treatment methods, including disking, tilling, and seeding, and use of livestock.

3.7.3.3.3 Direct and Indirect Effects under Alternative B (No Fire Use Alternative)

The effects to paleontological resources under Alternative B would be less than for Alternative A. Approximately 6,350 acres would be treated annually, half as many as would be treated under Alternative A, and the BLM would not be able to use prescribed fire or wildland fire for resource benefit. Thus, there would be no risks to fossils from the use of fire, or from the equipment used to conduct these treatments. The BLM would conduct stream bioengineering on approximately 31 miles under this alternative; risks to fossils from stream treatments would be similar to those for Alternative A. Instead of using fire to treat Phase II and III pinyon-juniper, the BLM would rely on tracked bulldozers to pull an Ely chain to break up the continuity of fuels, and disking, harrowing, and drill seeding to remove noxious weeds and other invasive non-native vegetation and restore sagebrush habitat, potentially exposing fossils.

3.7.3.3.4 Direct and Indirect Effects under Alternative C (Minimal Land Disturbance Alternative)

The effects to paleontological resources under Alternative C would be less than for the other action alternatives. Only about 3,200 acres would be treated annually, one-fourth that of Alternative A, and only using manual and classical biological control methods. Both of these methods would have little or no ground disturbance, and would not be done near rock outcrops. The BLM would conduct about 8 miles of riparian restoration, but the area of disturbance would be very small and the BLM would not be able to use mechanical equipment to restore stream habitat.

3.7.3.3.5 Direct and Indirect Effects under Alternative D (No Action Alternative)

There would be no direct effects to paleontological resources under Alternative D as no treatments would be authorized under this alternative. The BLM would not create fire and fuel breaks; thin and remove pinyon-juniper to promote healthy, diverse stands; slow the spread of noxious weeds and other invasive non-native vegetation,

especially cheatgrass; restore fire as an integral part of the ecosystem; or reduce the risk of a large-scale wildfire. As a result, there may be loss of soil and other land degradation that could affect paleontological resources found close to the ground surface, but this risk would be negligible.

3.7.3.4 Cumulative Effects

The CESA for paleontological resources is the same as for geology and minerals and is the 3 Bars Project area (**Figure 3-1**).

3.7.3.4.1 Cumulative Effects under Alternative A (Preferred Alternative)

Cumulative effects to paleontological resources would result from surface disturbance related to industrial developments, unauthorized collection, and natural erosion processes in the CESA area. Utilities and infrastructure and land development activities in fossil-bearing formations could impact, expose, damage, or destroy paleontological resources, although these activities would be unlikely in the 3 Bars Project area. These projects would require large amounts of sand, gravel, and crushed rock, however, and these materials could contain fossils.

The BLM would continue to use ground-based herbicide applications to remove noxious weeds and other invasive non-native vegetation, and aerial-based application methods to remove cheatgrass, and would restore burned areas under the Burned Area Emergency Stabilization and Rehabilitation program, under existing authorizations on about 1,000 acres annually. These treatments should not have a direct effect on paleontological resources, which would be found in rock outcrops or buried in the soil. These treatments would help to reduce hazardous fuels, slow the spread of noxious weeds and other invasive non-native vegetation, and reduce surface runoff and erosion associated with burn sites, potentially to the benefit of paleontological resources.

The BLM would conduct hazardous fuels and habitat restoration treatments on about 1,500 acres annually under existing authorizations, and likely on additional acreage under future authorizations, within the CESA. The effects of these treatments on paleontological resources would be similar to those for 3 Bars Project treatments and should be negligible.

The 8,300 acre Mount Hope Project is in the southeastern portion of the 3 Bars Project area. There are no known fossil-bearing rocks associated with the Mount Hope Project, and most geologic units associated with the mine site have low probability of having fossils (USDOI BLM 2012c:3-268). Mines occurring in non-fossil-bearing geologic formations would not impact or affect paleontological resources.

Surface disturbance from drilling of wells and construction of infrastructure for oil, gas, or geothermal development could impact fossil resources. The primary impact to paleontological resources would result from the excavation of material for construction of the permanent facilities. Extraction of gravel materials could impact paleontological resources. If a pipeline was constructed and placed underground, there could be impacts to subsurface fossil resources. Overall, disturbance from development would have a very low probability of impacting paleontological resources.

In the context of other land-disturbing activities in the CESA, effects from the 3 Bars Project would be negligible, as less than 2 percent of the surface area (about 12,700 acres) would be disturbed annually from 3 Bars Project actions. Thus, the cumulative effects from project actions in the context with disturbances from other activities within the CESA should be negligible.

3.7.3.4.2 Cumulative Effects under Alternative B (No Fire Use Alternative)

Under Alternative B, effects from non-3 Bars Project reasonably foreseeable future actions on paleontological resources would be similar to those described under Alternative A. The cumulative risks to paleontological resources under Alternative B would be less than for Alternative A, as only half as many acres would be treated on the 3 Bars Project area and fire treatments would not be allowed under this alternative. However, the BLM would compensate for not being able to use fire by using heavy equipment, which could increase the risk to paleontological resources. Approximately 6,300 acres would be treated annually on the 3 Bars Project area to improve habitat and reduce hazardous fuels, or about 1 percent of the CESA. Thus, the cumulative effects from project actions in the context with disturbances from other activities within the CESA should be negligible.

3.7.3.4.3 Cumulative Effects under Alternative C (Minimal Land Disturbance Alternative)

Under Alternative C, effects from non-3 Bars Project reasonably foreseeable future actions on paleontological resources would be similar to those described under Alternative A. The cumulative risks to paleontological resources under this alternative would be the least for the action alternatives. Approximately 3,200 acres would be treated annually on the 3 Bars Project area, or about 0.5 percent of the CESA. Only manual and classical biological control methods would be used, and these methods would have negligible effect on fossils. Stream bioengineering would occur on only about 8 miles of stream during the life of the project, one-fourth the mileage treated under Alternative A.

3.7.3.4.4 Cumulative Effects under Alternative D (No Action Alternative)

There would be no cumulative impacts to paleontological resources as no treatments would be authorized under this alternative. This alternative would not reduce the risk of wildfire or loss of soil due to erosion, thus there could be effects to fossils if wildfires occur in rock outcrops, or fossils are lost due to erosion.

3.7.3.5 Unavoidable Adverse Effects

The loss of paleontological resources has the potential to be adverse, especially if it results in the loss of scientifically important fossils. However, if surveys and inventories are conducted in areas where ground-disturbing activities are proposed to occur, the likelihood of adverse impacts would be greatly reduced and any impacts that did occur would be minimal.

3.7.3.6 Relationship between Local Short-term Uses and Long-term Productivity

Because paleontological resources are nonrenewable, there is no difference between short-term and long-term impacts. The resource cannot recover from some types of adverse impacts. Once disturbed, the materials and information associated with paleontological deposits may be permanently compromised. Any destruction of paleontological sites, especially those determined to have particular scientific value, would represent long-term losses. Furthermore, once paleontological deposits were disturbed and exposed, natural erosion could accelerate the destruction of fossils, and exposed fossils would be vulnerable to unauthorized collecting and digging. Any discoveries of paleontological resources as a result of surveys required prior to treatment would enhance long-term knowledge of the area and these resources (USDOI BLM 2007b).

3.7.3.7 Irreversible and Irretrievable Commitment of Resources

Because paleontological resources are nonrenewable, any impacts would render the resource disturbance irreversible and the integrity of the resource irretrievable.

3.7.3.8 Significance of the Effects under the Alternatives

None of the alternatives would be expected to result in the loss or destruction of scientifically important or valuable paleontological resources within the CESA or 3 Bars Project treatment areas. Thus, none of the direct, indirect, or cumulative impacts from the alternatives would create a significant impact within the CESA or 3 Bars Project area.

3.7.4 Mitigation

No mitigation measures for paleontological resources are recommended. According to Instructional Memorandum 2009-011 *Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources* (USDOI BLM 2008e), "If the proposed project will not disturb potentially fossil-yielding bedrock or alluvium, no additional work is necessary… Examples of such projects include noxious weed spraying, mechanical brush treatment, geophysical exploration, or surface disturbing activities such as road construction when the fossil resource is expected to be buried well below project compression or excavation depth or when surface fossil resources would be left undamaged."

3.8 Soil Resources

3.8.1 Regulatory Framework

There are no federal or state laws or regulations specific to soil. State and federal agencies, however, have identified best management practices (BMPs) to limit the effects of soil erosion on the aquatic environment, including water quality. The USEPA guidelines define BMPs as "methods, measures, or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation and maintenance procedures, and scheduling and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice. Best management practices are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility."

The BLM Nevada Northeastern Great Basin Resource Advisory Council, as chartered by the USDOI to promote healthy rangelands, has developed Standards and Guidelines for grazing administration on about 16.2 million acres of public lands in Nevada. Included in the Standards and Guidelines is Standard 1 – Upland Sites. This Standard states that "upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate and land form." Indicators include canopy and ground cover, including litter, live vegetation and rock, appropriate to the potential of the site. Livestock grazing management and wild horse and burro population levels are appropriate when in combination with other multiple uses they maintain or promote upland vegetation and other organisms and provide for infiltration and permeability rates, soil moisture storage, and soil stability appropriate to the ecological site with management units (USDOI 2007b).

3.8.1.1 Nevada Best Management Practices

The use of BMPs in Nevada is addressed in the *Handbook of Best Management Practices* (Nevada Division of Environmental Protection and Nevada Division of Conservation Districts 1994). Nevada Administrative Code