# PROGRAMMATIC ENVIRONMENTAL ASSESSMENT
# BODIE HILLS UPLAND VEGETATION RESTORATION

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**BLM Bishop Field Office**
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# CHAPTER 1: INTRODUCTION

## Summary

This Environmental Assessment (EA) was prepared to analyze and disclose the environmental consequences of conducting an upland vegetation restoration program on public lands managed by the Bureau of Land Management (BLM) Bishop Field Office in the Bodie Hills of Mono County, California. This EA provides a programmatic level analysis of potential impacts that could result from implementation of the proposed program or one of the alternatives. It does not identify the exact location of potential restoration treatment units, but it does describe the criteria for selecting restoration treatment units and the treatment methods that could be used for restoration. The EA assists the BLM in project planning and in ensuring compliance with the National Environmental Policy Act (NEPA) and other applicable laws and policies affecting the proposed program and alternatives. If the Bishop Field Manager determines that this action would have "significant" impacts based on the analysis in the EA, then an Environmental Impact Statement (EIS) would be prepared for the action. If not, a Decision will be issued along with a Finding of No Significant Impact (FONSI) statement, documenting the reasons why implementation of the selected alternative would not result in "significant" environmental impacts. If one of the action alternatives is selected, subsequent decisions on individual restoration treatments would be made when they are designed and would be tiered to this analysis.

## Background

This proposed project is a program of upland vegetation restoration treatments for BLM administered public lands in the Bodie Hills. The primary purpose of the proposed project is to maintain and improve the overall ecological condition and resiliency of upland vegetation systems in the project area. The Bodie Hills are a distinct mountain range located at the western edge of the Great Basin, just east of the Sierra Nevada and spanning the California-Nevada state line. The area is characterized by large expanses of sagebrush steppe typical of the Great Basin. These ecological systems are threatened by processes that have already degraded much of the Great Basin, including interrelated factors such as changing fire regimes, expansion and infilling of pinyon-juniper (*Pinus monophylla* and *Juniperus osteosperma* and *J. occidentalis* spp. *australis*), and the introduction of non-native invasive plants such as cheatgrass (*Bromus tectorum*). In contrast to substantial portions of the region, the ecological systems of the Bodie Hills have not undergone large scale conversion to uncharacteristic vegetation. However, a recent evaluation of ecological conditions in the Bodie Hills has documented that active management is needed to maintain and improve the ecological condition and resiliency of upland vegetation systems in the area (Provencher, Low et al. 2009).

### *Project Area*

The Bodie Hills are mostly public and national forest system lands managed by the BLM and the Humboldt-Toiyabe National Forest with private inholdings typically centered on meadows and water sources. The core of the range and all the lands to the west and east are managed by the BLM. The project area includes all BLM administered public lands in the Bodie Hills and is located entirely within Mono County, California (See Figure 1). The perimeter includes

approximately 191,750 acres in all ownerships, but the proposed project is limited to the 167,100 acres of BLM administered public land. The southern boundary runs north of Mono Lake along the BLM and Inyo National Forest boundary and California State Highway 167. The eastern boundary is the California-Nevada state line. The northern and western boundaries are the BLM and Humboldt-Toiyabe National Forest boundary line.

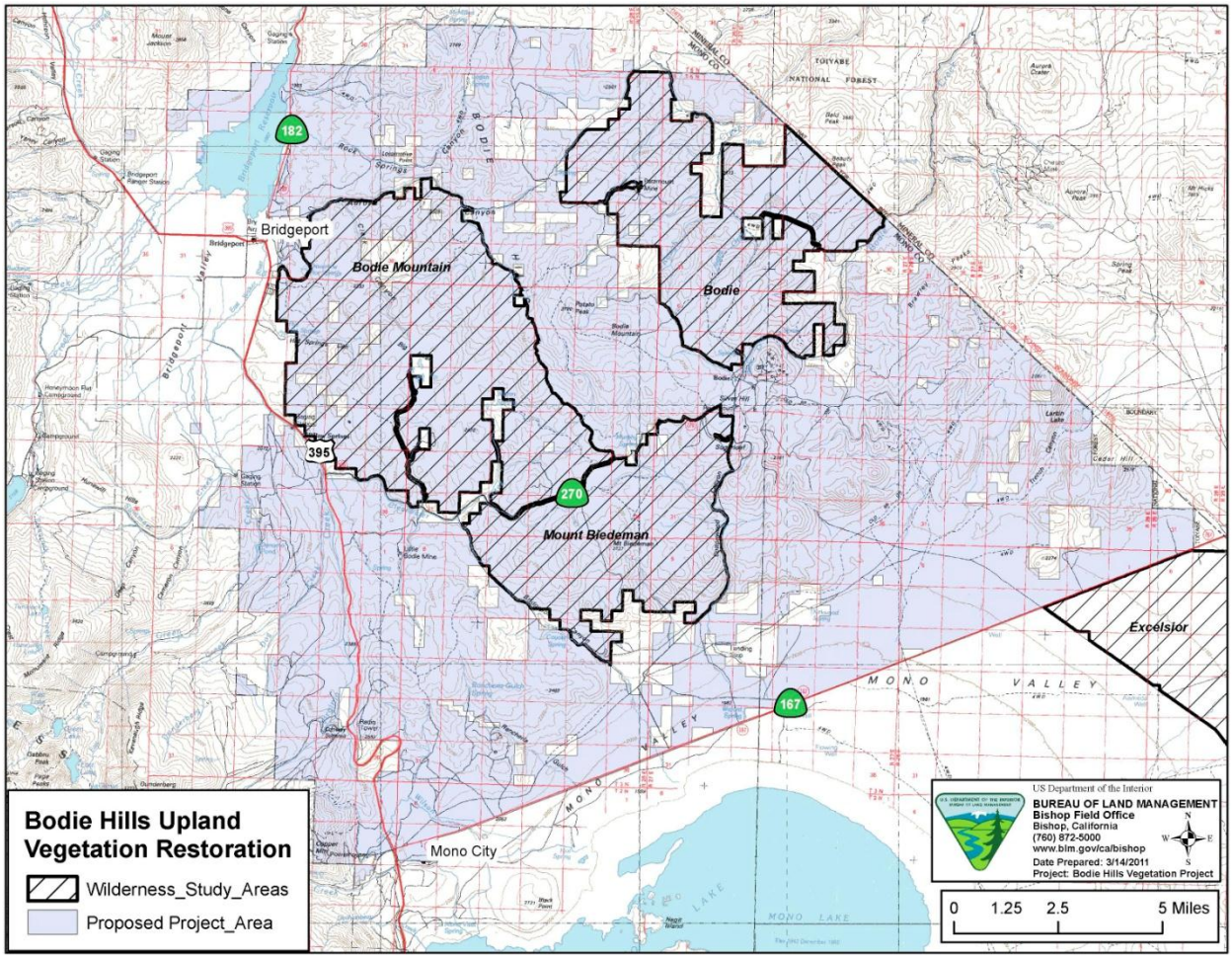


**Figure 1.** Map of the proposed project area. Includes all the BLM managed lands in the Bodie Hills and the adjacent landscape west of Highway 395.

The elevation range is between 6,500 feet along the southern boundary near Mono Lake and 10,236 feet at the summit of Potato Peak. In general, vegetation is dominated by a mix of sagebrush and mountain shrub associated ecological systems interspersed with pinyon-juniper woodlands at the mid elevations.

### *Regional Setting - Ecological Conditions in the Great Basin*

Dramatic ecological change has affected large areas of the Great Basin in recent times, largely due to a set of interacting dynamics with their roots in land management that began more than 100 years ago. The rate of pinyon-juniper expansion over the last 130 years is greater than any similar period of time in the last 5,000 years (Miller and Tausch 2001). Invasive annual grasses have been introduced across the region, resulting in a changed fire regime and the conversion of many sites to non-native annual grasslands.

Effects to the fire regime are one of the most important factors causing vegetation change (Miller and Tausch 2001). The fire regime began to change in the Great Basin in the 1800s in response to several dynamics including changing climate after the end of the Little Ice Age (650 to 150 years before present), changes in Native American land use practices due to the arrival of Euroamerican settlers, and the introduction of widespread domestic livestock grazing (Tausch, Nowak et al. 2004). The drying and warming climate after the Little Ice Age reduced the growth of fine fuels resulting in less frequent and less widespread fires. Similarly, the introduction of domestic livestock at high stocking rates removed much of the grasses and fine fuels that carry fire from shrub to shrub in the sparse vegetation typical of the Great Basin steppe. Grazing levels at the turn of the century were unregulated and much higher than those permitted today (Tausch, Nowak et al. 2004). Active fire suppression has since further contributed to decreased fire frequency throughout the region.

Historically, pinyon woodlands typically occupied fire safe sites with shallow, rocky soils and sparse understories. Pinyon-juniper extent outside fire safe sites was primarily controlled by frequent fire consuming the smaller trees before the understory fuels were outcompeted by trees. As the fire frequency rapidly declined, pinyon-juniper began expanding and infilling shrubland sites characterized by deeper soils.

In addition to changes mediated through the fire regime, there are several other factors that may have increased the competitive advantage of pinyon-juniper over understory species. Heavy grazing at the turn of the century reduced competition by understory species and increased shrub densities leading to more establishment microsites for pinyon seedling under shrubs. Atmospheric change due to industrial activity has increased nitrogen (N) deposition and ambient carbon-dioxide ($CO_2$) levels which has been shown to potentially fertilize woody species giving them a competitive advantage (Romme, Allen et al. 2009).

The introduction of non-native invasive annual grasses, primarily cheatgrass, has affected lower elevation sites by altering the fire regime in the opposite direction (D'Antonio and Vitousek 1992; Brooks, D'Antonio et al. 2004). Great Basin ecological systems typically have a large spacing between plants and there is no annual grass native to the system. Introduced annual grasses fill in the spaces between the shrubs and create a continuous fine flashy fuel bed. This leads to more frequent and larger fires. Annual grasses respond positively to fire and compete very aggressively with the native species. After multiple fire cycles, ecological systems can be completely converted to non-native annual species.

Commensurate with sagebrush steppe habitat degradation throughout the Great Basin due to these ecological dynamics, as well as the active destruction of sagebrush steppe to convert it to other uses, species dependent upon these habitats have also been in decline. The most high profile species suffering from impacts to sagebrush steppe is the greater sage-grouse (*Centrocercus urophasianus*), proposed for listing as threatened under the the Endangered Species Act (ESA).

***Project Area Setting - Ecological Conditions in the Bodie Hills***

In general, the ecological conditions of upland vegetation systems in the Bodie Hills are characterized as being in relatively good condition when compared with much of the Great Basin. The area has not been converted to other vegetation types for agricultural purposes and it is still dominated by native species. Cheatgrass is present in some sites, especially at the lower elevations, but to date no type conversions to non-native annual grasslands have occurred. However, some recent fires on the western edge of the area have revegetated with increased cheatgrass cover. Similar to other parts of the Great Basin, there has also been widespread expansion and infilling of pinyon and juniper. Cheatgrass presence, increased woodland extent and density, and the potential for large scale fire currently pose a substantial threat to many sagebrush associated upland vegetation sites in the area.

The Bodie Hills are one of the important strongholds for sagebrush steppe dependent species. The US Fish and Wildlife Service (FWS) have determined that greater sage-grouse in the Bodie Hills are part of a distinct population segment (DPS) (USDI FWS 2010b). On October 28, 2013 the FWS published a proposed rule to list the DPS as threatened under the ESA. At the same time, the FWS proposed approximately 1.8 million acres of critical habitat. This DPS, called the Bi-State population, was given a higher priority for listing than the greater sage-grouse range wide primarily due to the relatively small and isolated nature of this population and the magnitude and immediacy of habitat-based threats facing the DPS (USDI FWS 2010b). The breeding complex in the Bodie Hills is one of the largest in the Bi-State area and 99% of the Bodie Hills Project Area is within the boundaries of proposed critical habitat.

Over the past decade, the BLM has implemented several small-scale, site-specific projects that address some of these issues primarily to improve sage-grouse habitat and to reduce fuel loads near communities. The BLM has also recognized that these issues are large scale and likely need to be addressed at a landscape level in order to increase their overall effectiveness. In response, the Bishop Field Office undertook several partnerships to gather the necessary information about prevailing conditions, to identify the best methods of treatment, and to involve the community in a landscape level conservation planning process. One study, completed in partnership with United States Geological Survey (USGS), looked at the best methods for treatment. A second study, completed in partnership with The Nature Conservancy (TNC) and interested stakeholders, looked at the ecological conditions across the landscape and how much treatment would be necessary to be effective.

In 2006, the BLM partnered with the USGS to implement a study of the effectiveness of methods for treatment of expanding pinyon in the Rancheria Gulch area of the Bodie Hills. The study involved treatments in three different stages of pinyon expansion and infilling ranging from early low density (Stage I) to late high density stands (Stage III). Treatments evaluated were hand cutting with piling and burning, mastication, and a control (areas of no treatment identified as equivalent sites for comparison). The first few years of vegetation response data have been analyzed and show that after treatment there was an increase in shrubs, perennial grasses, and native forbs in all treatments except the control. The best native species response generally occurred in the cut/pile/burn treatment and in sites with the lowest tree cover. Cheatgrass abundance and response was highly variable among plots (both treatments and controls) and no statistically significant effect of treatments on cheatgrass was documented. The mastication

treatments increased the fine fuel bed due to the layer of chips left on the surface (Matchett, Brooks et al. 2010). Because the cut/pile/burn treatments had the best native species response, did not leave a continuous layer of fine fuels on the surface, and appear to be much more acceptable to the local community, it is the primary tree encroachment treatment method proposed in this EA. Mastication is not a proposed tree encroachment treatment method in any of the alternatives. Restoration treatments being analyzed in this EA would be implemented very differently from this study. They would be in the most optimum sites using the most optimum methods and in natural patterns rather than small randomized blocks.

In September 2007, the BLM entered into a cooperative agreement with TNC to analyze the current condition of the Bodie Hills ecological systems and to predict their future condition under several different management scenarios developed with public input from stakeholders. The study's purpose was to inform and guide the formulation of future vegetation management projects to protect and enhance the ecological integrity of the area. The analysis used satellite imagery, vegetation condition mapping, predictive ecological models, and cost-benefit assessments. Three workshops were held with a diverse group of stakeholders during 2008 to review and refine ecological models, to review findings, and to identify potential vegetation management scenarios. At a landscape scale, the results of this cooperative effort with TNC found that without proactive management several upland vegetation systems in the Bodie Hills have sites that are at high risk of converting to undesirable states in the future (Provencher, Low et al. 2009).

In the public workshops, the stakeholders agreed on the use of two measures to summarize the ecological condition of the Bodie Hills: Ecological Departure and High Risk Vegetation Classes.

Ecological Departure is an index of how the current mix of vegetation states within an ecological system differs from the best available information on its Natural Range of Variability[1]. TNC identified 15 ecological systems in the Bodie Hills for evaluation with input from the public workshops. The study found some level of Ecological Departure in most Bodie Hills ecological systems. Five are slightly departed, five are moderately departed, and five are highly departed. The primary cause of high departure is that the sagebrush associated systems are significantly lacking the earliest successional classes (stages of development after a disturbance). Montane sagebrush, the most abundant ecological system in the Bodie Hills, is a good example. Montane sagebrush comprises almost 120,000 acres, over 63% of the project area. It has very little vegetation in the early succession classes and is dominated by late succession classes. In addition, a portion is depleted of native grasses and forbs, a portion has some cheatgrass mixed in with the native perennial grasses, and a portion has experienced extensive pinyon and juniper expansion and infilling, particularly at middle elevations (Provencher, Low et al. 2009). The study also predicted that in the absence of active management, several ecological systems will become increasingly ecologically departed over the next 20 years and several systems will have substantial increases in vegetation classes at high risk of conversion to undesirable unnatural states such as invasive weeds (Provencher, Low et al. 2009).

[1] Natural range of variability (NRV) describes the variation of vegetation states across the landscape due to the natural biotic or abiotic processes without intervention from industrial societies.

Ecological departure also increases agency and public concern about the risk of wildfire to communities, structures, and historic resources such as Bodie State Historic Park. Fire suppression and reduced fire frequencies have led to relatively uniform late seral vegetation conditions and high fuel loads across the landscape. This increases the risk for a larger and more severe fire. Pinyon-juniper expansion and infilling has created a nearly continuous tree belt in the mid elevations. Once pinyon-juniper becomes continuous and excludes the shrub and herbaceous species low intensity fires are rare, but a crown fire can become established under extreme weather conditions and result in very large and high intensity fires atypical of these ecological systems. At the lower elevations, annual grasses facilitate rapid fire spread and flashier fire conditions. Fires can establish and spread very quickly under conditions that in the past would not have supported a wildland fire. Several recent fires in adjacent landscapes are examples of this novel fire behavior (Dana Fire 2004, John Fire 2011).

Stakeholders who participated in the BLM-TNC analysis of the Bodie Hills identified key ecological systems for management action based on their current condition, likely future ecological departure and/or potential for increased high-risk classes, as well as feasibility for successful management action. The analysis modeled the predicted landscape level effects of several management scenarios on these key ecological systems over a 20 year period and reported on their predicted success in terms of ecological departure, high risk vegetation classes, and return on investment.

***Scope of the Proposal***

Ecological systems identified as priorities for restoration in the TNC analysis included both upland (arid systems away from water sources) and riparian systems (moist to wet systems that depend on springs and creeks). The key upland systems identified for management action based on the TNC analysis and public input are montane sagebrush, Wyoming big sagebrush (both sandy and loamy systems), low sagebrush, and basin wildrye-big sagebrush. One additional upland system, mountain shrub, was found to be not as highly departed from the natural range of variability but could also benefit from management to increase the proportion of early seral states due to the lack of recent fire (Provencher, Low et al. 2009). The likelihood of success in using prescribed burning to introduce early seral stages is very high due to the mesic nature of these sites and the ecology of this system, so it was also included in this proposal. The key riparian systems identified for management action based on the analysis are montane riparian, stable aspen, and wet meadows.

In general the restoration needs and strategies for upland and riparian systems differ greatly, but there are a few instances where the main concern is a lack of early seral vegetation stages. In addition, measureable restoration of the upland systems will not occur absent a landscape level strategy and action by the BLM, which manages the vast majority of the upland area. In contrast, the majority of riparian systems in the Bodie Hills are privately owned and site-specific management action is the best and most efficient approach for improving their ecological condition. Therefore, this project focuses on the restoration of upland ecological systems but includes some strategies that are common between upland and riparian areas. Examples include prescribed burning where embedded and adjacent riparian systems could benefit from the treatment applied to the surrounding upland system.

The TNC analysis was based on management scenarios that modeled 20 years of treatments, but this NEPA analysis has been limited to 10 years of treatment as a reasonable timeframe for a management decision. After 10 years, the results of the program can be evaluated to allow for changes if necessary to achieve the desired goals.

## Purpose and Need for the Action

The purpose of the proposed project is to improve the overall ecological condition and resiliency of the most ecologically departed and at risk upland vegetation systems in the Bodie Hills by preventing or limiting future increases in ecological departure and high risk vegetation classes and where possible by restoring some of the natural range of variability. This purpose will accomplish multiple important objectives for management of the natural resources of the Bodie Hills. It will make at risk upland ecological systems more resistant to conversion to non-native species, increase the potential for a natural disturbance regime to be reintroduced, benefit wildlife such as greater sage-grouse, and reduce the risk of damage to adjacent communities, historic and cultural resources, and other ecosystem dependent values (wilderness characteristics, watershed, visual quality, recreation, etc.).

The need for action is based on the current and predicted future condition of key upland ecological systems in the Bodie Hills. Currently, multiple upland vegetation systems are highly ecologically departed from their natural range of variability. There are also multiple upland ecological systems that have sites that are at risk of future conversion to undesirable states outside the natural range of variability, such as transition to non-native annual grasslands or sagebrush associated shrublands encroached by pinyon and juniper. The ecological departure of the upland vegetation systems in the Bodie Hills is due largely to the fact that reduced fire frequencies have resulted in a landscape dominated by late seral developmental stages. This limits the availability of early and mid seral vegetation conditions, especially in sagebrush associated shrublands, required for long-term maintenance of these systems and for use by sagebrush dependent wildlife species. It also results in relatively uniform, continuous fuel loads which increases the risk of large scale wildfire with potential negative consequences for wildlife habitat, adjacent communities, historical and cultural resources, and other ecosystem dependent values (wilderness characteristics, watershed, visual quality, recreation, etc.).

The Bodie Hills are in relatively good condition compared to the Great Basin as a whole and provide important habitat for wildlife and native plants. Major ecological changes in the Great Basin over the last century provide a clear example of why active management is needed to protect the Bodie Hills from those threats.

## Programmatic Scope

Public land management needs to address ecological issues at a landscape scale rather piecemeal in small project units and planning efforts (Hobbs 1998; Wisdom and Chambers 2009; Pyke 2011). This issue has also been raised by the public in previous planning efforts for projects in the Bodie Hills. In response, the BLM conducted a landscape scale, all ownership analysis of ecological conditions in cooperation with TNC and interested stakeholders. The resulting

analysis documented the need for a landscape level, long-term program of upland vegetation treatments to maintain and improve the overall ecological condition and resiliency of the area.

The BLM has determined that the appropriate level of NEPA analysis required to make a decision to implement a landscape level, multi-year program of upland vegetation restoration treatments in the Bodie Hills is a programmatic EA instead of considering each potential treatment unit individually as it is identified. Where federal programs involve many individual actions, the Council on Environmental Quality (CEQ) has endorsed the concept of performing tiered analysis from a larger programmatic analysis to site specific actions (40 CFR 1502.20 and 1508.28). The CEQ NEPA regulations encourage agencies to prepare "tiered" environmental analyses to assist in the evaluation of a large-scale program or project involving a series of related decisions. Programmatic environmental reviews, such as this EA, may cover basic issues and environmental effects so that these issues do not need to be repeated in subsequent NEPA analyses prepared for the individual actions within a program. Also, programmatic environmental reviews promote consideration of cumulative environmental impacts that might be missed in individual assessments prepared on a case-by-case basis.

The intent of this programmatic environmental review is to:

- Evaluate and determine the appropriate methods and the amount of treatment to be conducted in the Bodie Hills;
- Identify common design features to assure that vegetation treatments can be completed without adversely impacting values and resources in the Bodie Hills;
- Allow restoration treatments to meet multiple objectives by being placed strategically in the landscape and being analyzed together;
- More effectively analyze the combined environmental and cultural effects of the entire upland vegetation restoration program and the cumulative effects when combined with other actions;
- Establish program-wide monitoring and adaptive management strategies to better respond to changes as individual projects are implemented; and
- Streamline and expedite the environmental review and assessment process for individual treatment units.

## Decision to be Made

This EA will identify and disclose the environmental impacts that could result from implementation of a proposed landscape level upland vegetation restoration program on BLM administered public lands in the Bodie Hills. Based on the analysis in the EA, the Bishop Field Manager will decide whether to implement the restoration program as proposed, to implement an alternative to the proposed restoration program, or to take no action.

## Analysis Process for Subsequent Tiered Decisions on Treatment Units

The individual treatment units for a long-term program of restoration cannot be practically identified in advance, so this programmatic EA analyzes the criteria for identifying those locations and treatment methods in subsequent decisions.

If the Bishop Field Manager selects one of the action alternatives evaluated in this EA, subsequent environmental review will follow the policies and procedures in the BLM National Environmental Policy Handbook (H-1790-1) to determine the appropriate level of public input and analysis to be conducted for subsequent decisions on individual treatment units. At a minimum, a Determination of NEPA Adequacy (DNA) will be conducted for each individual treatment to determine if the effects of the action are adequately analyzed in this document. The BLM will also consult with the appropriate tribes as treatment locations are being selected consistent with Section 106 of the National Historic Preservation Act (NHPA).

The BLM has the discretion to do public scoping during a DNA review to identify potential additional issues to be considered if the Bishop Field Manager determines that public input opportunities completed as a part of this programmatic EA were not adequate for the attributes of specific proposed treatment units (H-1790-1). Where a DNA finds that all issues have already been adequately analyzed in this EA, a decision will be made without further analysis. Any such decision will be subject to appeal pursuant to 43 CFR Part 4.

Where site-specific concerns are identified which were not considered in this EA, such as for a site with unique environmental or cultural considerations, a separate site-specific NEPA analysis that is tiered to this EA will be conducted to ensure all potential effects to environmental and cultural resources are thoroughly evaluated. Public input opportunities associated with that NEPA analysis will be offered. Any decision based on that NEPA analysis would also be subject to appeal pursuant to 43 CFR Part 4.

## Public Involvement

This project is the result of an on-going public process. It started with the BLM initiating a landscape scale analysis of ecological conditions and potential management options for the Bodie Hills in 2007 in cooperation with TNC and interested stakeholders. The BLM clearly recognized the need for science-based management at the landscape level as well as the public concern that several small projects would not address the needs of the entire ecosystem. Public input and participation was solicited throughout the process and has helped to define the scope and measures proposed. From the results of this analysis, a proposal was developed and the formal NEPA process was initiated in March 2011 with public scoping. Public participation and input opportunities are summarized below:

- 2007-2009: BLM invited all interested parties to 3 workshops to assess the ecological condition of the Bodie Hills and to identify potential management strategies. These workshops were facilitated by The Nature Conservancy (TNC) and open to anyone interested. Multiple announcements were mailed to a broad mailing list.
- March 15, 2010: A public meeting was held in Bridgeport to present the results of the TNC assessment. Twenty-one people attended.
- August 17, 2010: BLM sent a letter to interested parties announcing the development of a proposal based on the TNC assessment and inviting the public to participate in the process.

- March 2011: Public scoping of the Bodie Hills Upland Restoration Project began. Scoping letters were mailed on March 3, 2011 to a broad mailing list including anyone who had expressed an interest in the previous assessment. The project was also listed on the BLM public web site. Input was requested by April 4, 2011, but the scoping period was extended allowing anyone who expressed an interest to have input. Fifteen individuals and groups commented.
- Aug 1, 2011, Sept 21, 2011 and November 1, 2012: BLM offered three separate field trips to the project area. The field trips were attended by 16, 13, and 6 individuals respectively.
- March 22, 2013: 30-day public comment period on the EA began. Fourteen comment letters were received. Substantive comments and their responses are in Appendix D. Some comments led to minor updates to this document, but no major changes were made.
- On-going since March 2011: Tribal consultation with affected and interested tribes has been on-going since the proposal was scoped. Tribal consultation included a field trip to the project area with tribal representatives

## Issues

The following issues were identified in comments received during public scoping which began on March 3, 2011. A table listing all comments and how issues were identified or dealt with in the EA is available in the project record at the Bishop BLM Office. Each issue is analyzed individually in the Environmental Analysis (Chapter 3).

***Ecological Departure***

1. How effective will the treatments be at reducing the departure from the Natural Range of Variability (NRV)?
2. How does the use of the NRV as a metric affect the analysis of effects and how is past and future variability accounted for?
3. Do the VDDT model and FRC metric accurately describe the vegetation conditions and the predicted effects of the proposed treatments?

***Fragmentation***

4. Will the treatments lead to increased fragmentation of ecosystems in the Bodie Hills?

***Fire Regime***

5. What will the effect of the treatments be on the fire regime?

***Vegetation***

6. What are the long term past and potential future trends (including climate change) in vegetation, especially pinyon distribution, in the Bodie Hills and how will the project affect future dynamics? (Consider time frames as long as the Holocene, i.e. the last 12,000 years, and both natural and human induced trends.)
7. How do special status plant species respond to disturbance and how will they be affected by excluding them from the treatment units?
8. What are the potential effects of the project on the distribution and abundance of cheatgrass and other non-native invasive species and are the control measures included enough? What kinds of sites would be at risk of increases in non-native invasive species, especially cheatgrass?
9. How does vegetation recovery after pinyon removal depend on the pre-treatment cover?
10. What will the effects of burning be on the soil and vegetation regrowth?

11. What will the effects of pile burning be on the remaining pinyon pine trees?

***Wildlife***

12. What will the project effects be on wildlife populations especially sage-grouse, mule deer migration, pika, and pygmy rabbit? (Includes effects of altering cover of sagebrush and pinyon, treatments within 2 miles of leks, the use of prescribed fire, and implementation disturbance.)
13. How will treatment of late successional habitats affect species that use them? (see also effects to pinyon ecological services).
14. What will be the cumulative effect of the project combined with the hunting of sage-grouse authorized by CA DFG?

***Watershed***

15. What will the effects of the project be on watershed processes?

***Ecosystem Services***

16. Will the project affect the values and services offered by pinyon woodlands in the Bodie Hills including wildlife habitat and corridors, fall and winter food source, carbon sequestration, and genetic pool?

***Air Quality***

17. How will the project affect air quality in the Mono Basin and Bodie State Historic Park?

***Recreation***

18. What would the effects of the treatments, especially wood gathering, be on route proliferation and off-road vehicle use and what site types would be susceptible?

***Visual Quality***

19. What will the effect of the treatments (especially mowing, cutting trees, chipping, and seeding with a rangeland drill) and the rate of vegetation regrowth be on the visual appearance of the Bodie Hills especially critical viewsheds like the Bodie State Historic Park?

***Wilderness Values***

20. Will the effects of the project on naturalness of the WSAs affect their eligibility for designation as wilderness?
21. What will the effects of the project be on wilderness characteristics outside of WSAs?

***Land Status***

22. What is the status of the land transfer to State Parks and what will the effects be on those lands?

***Analysis Process***

23. How can the effects to specific resources be predicted if the treatment units with prescriptions are not yet identified?
24. How does the adaptive management plan take into account long term effects?

## Tiering to Existing Land Use Plan(s)/Environmental Impact Statement(s)

The Bishop Resource Management Plan (USDI BLM 1993a) provides a comprehensive framework for managing public lands administered by the Bishop Field Office. This EA is tiered to the Final Bishop Resource Management Plan and Environmental Impact Statement (USDI BLM 1991; USDI BLM 1993a) including the Fire Management Plan amendment (USDI BLM 2005a). Tiering helps focus this EA more sharply on the significant issues related to the proposed upland vegetation restoration program while relying on the Final Bishop Resource Management Plan and Environmental Impact Statement and the Fire Management Plan and Environmental Assessment for analysis and decisions on how the area will be managed including desired

vegetation conditions and landscape wide acceptable levels of prescribed fire and non-fire vegetation treatments.

## Plan Conformance

### Determination

The proposed action and all action alternatives are in conformance with the Bishop Resource Management Plan (RMP) approved on March 23, 1993, as amended by the Fire Management Plan in 2005.

### Rationale

The proposed action and all action alternatives analyzed in detail were designed and developed to be consistent with the General Policies, Area Manager's Guidelines, Valid Existing Management, Standard Operating Procedures, Decisions, and Support Needs prescribed in the Bishop RMP (USDI BLM 1993a). A summary of key RMP prescriptions specific to the proposed upland vegetation restoration program include:

- ***Area Manager's Guidelines (pg. 9):*** "4. Vegetation will be a key element in the plan and management will be directed toward the achievement of desired plant community goals" The project is designed to improve and maintain the ecological condition and the natural disturbance regime of the native vegetation of the Bodie Hills. The proposal implements this guideline.
- ***Standard Operating Procedures: Wildlife (pg. 12):*** "3. Manage candidate species, sensitive species and other species of management concern in a manner to avoid the need for listing as state or federal endangered or threatened species." The project is designed to improve wildlife habitat and wildlife habitat diversity throughout the landscape. Greater sage-grouse are a species of particular concern and treatments to benefit sage-grouse habitat are prioritized. See the analysis of the effects on wildlife under Issue 12.
- ***Area-Wide Decisions (pg. 17):***
    - "Manage all activities to conform with Visual Resource Management (VRM) standards" Design features are included in the proposed action and all action alternatives to conform to VRM standards. See the analysis of Issue 19.
    - "Protect and enhance unique or important vegetation communities and wildlife habitats. – Increase to 60% the amount of sagebrush habitat within 2 miles of leks that has optimum characteristics for sage-grouse. (Presently only 30% of sagebrush habitat has optimum characteristics for sage-grouse). – Manage sagebrush-bitterbrush areas within 2 miles of sage-grouse leks to meet desired plant community goals." As described above, treatments to improve sage-grouse habitat are a priority in the proposed action and all action alternatives including removal of expanding pinyon and juniper that adversely affects near lek sagebrush habitat quality.

The Bishop Field Office is divided into nine geographically delineated Management Areas (MAs). The proposed treatments analyzed in this EA would be implemented in the Bodie Hills

and Bridgeport Valley MAs and a small portion of the Granite Mountain MA. The following are some of the key Management Area Decisions related to the proposed action and other action alternatives:

- ***Bridgeport Valley MA (pgs. 27-30):*** The proposed action and other action alternatives conform to the VRM standards, help to meet Desired Plant Community prescriptions, and conform to direction for the Conway Summit Area of Critical Environmental Concern (ACEC) and the Travertine Hot Springs ACEC. Design features are included to protect visual resources in the Conway Summit ACEC.
- ***Bodie Hills MA (pgs. 30-34):*** The proposed action and other action alternatives conform to the VRM standards, include limited operating periods to provide seasonal protection in sage-grouse wintering areas, help to meet Desired Plant Community prescriptions, and conform to direction for the Bodie Bowl ACEC including VRM standards and protection of the National Historic Landmark from wildfire. The action alternatives do not include any surface disturbing activities that would adversely affect the National Historic Landmark (see analysis of Cultural Resources in the Environmental Effects Section).
- ***Granite Mountain MA (pgs. 34-37):*** The proposed action and other action alternatives conform to the VRM standards, enhance habitat for sage-grouse, mule deer and pronghorn ("Use selective removal of decadent vegetation to improve migratory habitat for the Mono Lake deer herd."), and help to meet Desired Plant Community prescriptions.

The project area does not occur within any designated Wilderness Area. There is no designated critical habitat for any federally listed species where treatment will occur. Eleven acres of designated critical habitat for Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*) occurs in the far western corner of the project area, but no treatment will occur there and no treatment is proposed that will impact critical habitat. Approximately 99% of the project area is proposed critical habitat for the Bi-State DPS of greater sage-grouse. This DPS is the only federally threatened, endangered or proposed species known to occur in the project area. This species is also designated as BLM sensitive. The other known resident BLM sensitive species is the pygmy rabbit (*Brachylagus idahoensis*). The proposed upland vegetation restoration program is expected to have an overall beneficial effect on these species (See the analysis of Issue 12).

The project area does not occur within any BLM designated wild horse Herd Management Area. However, there is occasional wild horse drift from the Powell Mountain Wild Horse Territory in Nevada into the eastern portions of the project area. The program of treatments is not expected to have any adverse effects on these wild horses.

The Fire Management Plan Amendment to the Bishop RMP (USDI BLM 2005a) sets limits on the amount of prescribed fire and non-fire vegetation management treatments by vegetation community and in each Fire Management Unit (FMU) and identifies goals for the amount of wildfire each decade. The project area includes the entire Bridgeport Valley-Bodie Hills FMU. The proposed action and each of the action alternatives analyzed in detail are consistent with the limit set for this FMU of no more than 15% of the landscape treated in a 10 year period (23,899 acres).

Due to the programmatic landscape scale of this project there are multiple other decisions in the

Bishop RMP (USDI BLM 1993a) to protect specific resources that cannot all be listed here. The proposal is consistent with these decisions and they are incorporated as necessary as Design Features applicable to the proposed action and other action alternatives

# CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

An Environmental Assessment (EA) must consider a reasonable range of alternatives including the proposed action and a no action alternative. Other alternatives may be needed to resolve conflicts or to address new conditions or new information. If other alternatives are identified or proposed during scoping but are determined by the BLM not to reasonably address the purpose and need for action, or not to be technically or economically feasible, or not to be in conformance with the land use plan, or not to be substantially different from another alternative in design or effects, they may be dismissed from detailed analyses (BLM Manual H-1790-1).

Public scoping raised issues which generated four additional alternatives for detailed analyses. Four additional alternatives were also considered but eliminated from detailed analyses. All of the alternatives considered are described below.

## Summary

## Alternatives analyzed in detail

***1. No Action***

No programmatic vegetation restoration program would be implemented. Case by case projects may be approved under separate NEPA analyses, but a landscape scale program would not be implemented. Under the No Action Alternative, on-going management in the Bodie Hills including monitoring programs, continued fire suppression, and all other approved projects and management would continue.

***2. Proposed Action***

A 10 year program of vegetation restoration treatments in specific vegetation conditions would be implemented. A maximum of 16,930 acres (10% of the total project area) would be treated in 6 upland ecological systems and 3 associated riparian systems where they are intermingled or adjacent and also meet treatment criteria. Treatment methods would include hand cutting, piling, chipping, mowing and broadcast prescribed burning. For details of this alternative, see the full description on pg. 24.

***3. Increased Acreage***

The Increased Acreage Alternative is the same as the Proposed Action above, except that the maximum acreage to be treated would be increased and one method would be added to treat the fuelbreak around Bodie State Historic Park. The total acreage would be the maximum acres allowed in the Bishop Fire Management Plan, 23,880 acres (14% of the total project area). This is a 40% increase over the treatment area in the Proposed Action. The added method would be targeted grazing around Bodie State Historic Park. Acreage targets are informed by the Ecological Management Scenario in the TNC report. For details of this alternative, see the full description on pg. 44.

This alternative was developed in response to comments that the amount of treatment proposed would not make a big enough difference in the ecological departure of the ecological systems in the Bodie Hills and that grazing was not considered as a tool.

***4. Treatment in CWPP WUI area only***

The Wildland Urban Interface (WUI) Alternative would be the same as the Proposed Action above except it restricts the treatments to within the Wildland Urban Interface as defined in the Mono County Community Wildfire Protection Plan (CWPP) (Mono County 2009) and lowers the total amount of treatment to 10,268 acres (6% of the total project area). This is 61% of the area treated by the Proposed Action. The ecosystem types are not evenly distributed throughout the Bodie Hills, so treatment acreages were adjusted proportionally to the occurrence of ecosystem types and the target states. For the details of this alternative, see the full description on pg. 50.

This alternative was developed in response to comments that objectives could possibly be met by only treating areas where fire threatens communities and structures. The CWPP WUI area only alternative was designed to encompass the area where fire could reach communities within a single burn period (a day of burning). Treating in these areas could potentially moderate fire behavior that has the potential to adversely affect communities and structures.

***5. Limited treatment in WSAs***

The Limited Treatment in WSAs Alternative would be the same as the Proposed Action outside the WSAs. Inside the WSAs it would limit the methods used to prescribed burning (broadcast and spot burning) and would consequently lower the total acreage treated to 12,903 acres (8% of the total project area). This is 76% of the treatment area in the Proposed Action. There are several ecological and logistical factors that limit the use of broadcast burning in specific ecosystems, and the maximum treatment acreages were adjusted proportionally to the occurrence of ecosystem types and the target states in the WSAs. The treatment methods used outside of WSAs would remain the same as the Proposed Action. For the details of this alternative, see the full description pg. 56.

This alternative was developed to respond to the concerns expressed in scoping regarding impacts of mechanical methods on the wilderness characteristics of the WSAs and to follow BLM policy that "[r]estoration treatments should use the least disruptive techniques that have the best likelihood for success" (BLM Manual 6300 1.6.D.8.D and 1.6.C.2.f). Comparison of the effects of this alternative with the Proposed Action will determine if mechanical methods are necessary and if they would impair the wilderness characteristics of the WSAs.

***6. No Treatment in WSAs***

The No Treatment in WSAs Alternative would be the same as the Proposed Action outside the WSAs but would not allow for any treatment inside the WSAs. This would lower the total amount of treatment to 11,288 acres (7% of the total project area). This is 67% of the treatment area in the Proposed Action. The ecosystem types are not evenly distributed throughout the Bodie Hills so treatment acreages were adjusted proportionally to the occurrence of ecosystem types and the target states as shown in the detailed tables in the full alternative description below (pg. 63).

This alternative was developed to respond to the concerns expressed in scoping regarding the effects of treatment on the WSAs and to conform to BLM policy for analysis of proposals in WSAs. "A reasonable range of alternatives, including alternative approaches to accomplishing the same management objectives, must be analyzed in the NEPA document, including alternative sites both inside and outside the WSA" (BLM Manual 6300 1.6.E.3.f.ii). Comparison of this alternative with the Proposed Action and the Limited Treatment in WSAs Alternative will help the BLM determine if treatment within the WSAs is necessary to achieve the purpose and need and to maintain or improve the wilderness characteristics of those WSAs.

## Alternatives considered but eliminated from detailed analysis

### *7. Community Protection Fuelbreaks Only*

Under the Fuelbreaks Alternative, the only treatments would be fuel breaks to protect communities and structures. All treatment locations would be immediately adjacent to structures and along roads in the Mono Basin where there are dispersed structures and private holdings. The methods would be primarily mowing and hand cutting. A maximum of 3,766 acres would be treated (22% of the Proposed Action treatment area). The area where these fuelbreaks could be installed would be 20,581 acres or 12% of the Proposed Action project area (see map below). Treatment would include the following acreages of treatment in each ecosystem type:

| Ecosystem type | Maximum acres | % of Proposed Action |
|---|---|---|
| 1. Basin wildrye - big sagebrush | 59 | 17% |
| 2. Low sagebrush | 66 | 3% |
| 3. Montane sagebrush steppe | 1575 | 15% |
| 4. Mountain Shrub | 156 | 16% |
| 5. Wyoming sagebrush – loamy | 833 | 98% |
| 6. Wyoming sagebrush –sandy | 971 | 65% |
| 7. Montane riparian | 12 | 41% |
| 8. Stable aspen | 39 | 8% |
| 9. Wet meadows | 54 | 54% |
| **TOTAL** | **3,766** | **22%** |

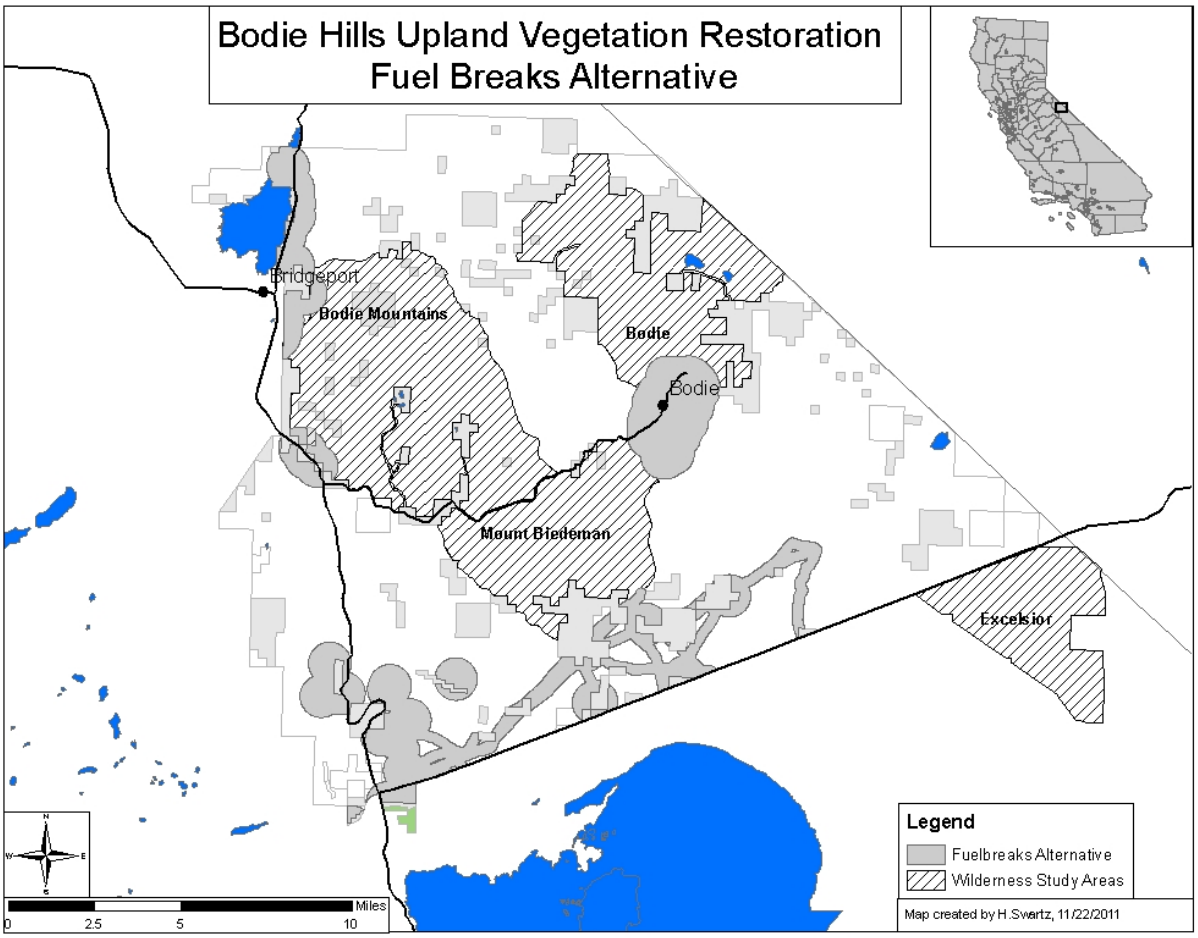


**Figure 2.** Map of the fuel breaks alternative (not analized in detail). A fuel breaks alternative would include only area immediately adjacent to structures and along roads in the Mono Basin where there are homes and developments to be protected.

This alternative was considered in response to comments that the scope of the proposal was too large and suggestions that treatment be limited to fuel breaks and protection of communities only.

*Rationale for excluding from detailed analysis*

The Fuelbreaks Alternative would not meet the purpose and need of improving the ecological condition of the Bodie Hills landscape and reducing departure from the natural range of variability. Only one of the ecological systems found to be highly departed from the natural range of variability would be treated at a level large enough to change its departure; the Wyoming sagebrush – loamy system. A portion of the Wyoming sagebrush – sandy system would also be treated but all the other systems would receive a half or less of the treatment necessary to meet the objectives in the Proposed Action. Montane sagebrush, the largest and one of the most departed systems, would only be treated at 15% of the Proposed Action levels. This is much too little to prevent further departure from the natural range of variability and therefore does not meet the purpose and need for action.

A fuelbreak system alone would not allow for greater use of natural fire throughout the landscape because of the existing uniform conditions and fuel loading. The need to prevent fires from reaching very large sizes outside the natural range of variability due to the uniform fuel conditions would still require active suppression actions.

***8. Front Loaded Alternative***

The Front Loaded Alternative would be the same as the Proposed Action, but for some treatments, the entire area of treatment would be implemented in the first 2 to 3 years of the program. This alternative is based on the Front Loaded scenario developed in the public workshops for the analysis done by TNC. The treatments, total acres to be treated, and project area are all identical to the Proposed Action. The only difference is the timing of the treatments.

This alternative was developed because several public scoping comments referred to this scenario from the TNC report. It is included here to explain why it was not considered even though it was one of the scenarios developed by TNC and the public during that process.

*Rationale for excluding from detailed analysis*

The effects of this alternative would be identical to the Proposed Action because the only difference is timing. The Proposed Action would allow for a variable number of acres to be treated each year, so the front loaded scenario could be implemented within the Proposed Action if funds and resources were available. In addition, this alternative is not considered economically feasible at this time based on recent and predicted funding levels.

***9. Complete Restoration of Ecological Departure Alternative***

The Complete Restoration Alternative would involve treatment levels that might completely restore all target ecosystems if implemented over the 20 years analyzed in the TNC report. The objective would be to reduce the departure of all the ecosystems of the Bodie Hills to less than 33% (FRCC1) over that time period. As in the Proposed Action, the goal is to accomplish the objectives in a 20 year window, but treatments would be planned for just the first half of that time period. An estimated 50,430 acres would have to be treated (a 298% increase over the Proposed Action). This is a conservative estimate because a complete simulation was not conducted. The project area would be the same as the Proposed Action. The treatments would be also be the same as those in the Proposed Action, but a larger number of acres would require intensive and very costly management techniques including mechanical treatment and then reseeding because sites with a much lower probability of success would have to be treated.

The following acreages of treatment would be required in each ecosystem:

| Ecosystem type | Maximum acres | % of Proposed Action |
|---|---|---|
| 1. Basin wildrye - big sagebrush | 525 | 150% |
| 2. Low sagebrush | 2050 | 100% |
| 3. Montane sagebrush steppe | 37834 | 358% |
| 4. Mountain Shrub | 1354 | 135% |
| 5. Wyoming sagebrush – loamy | 1049 | 123% |
| 6. Wyoming sagebrush –sandy | 6920 | 461% |
| 7. Montane riparian | 93 | 310% |
| 8. Stable aspen | 500 | 100% |
| 9. Wet meadows | 107 | 107% |
| **TOTAL** | **50432** | **298%** |

This alternative was developed to respond to questions about why the Proposed Action did not do more to restore the natural range of variability and in many cases only prevents increases in Ecological Departure or High Risk vegetation classes.

*Rationale for excluding from detailed analysis*
The Complete Restoration Alternative was excluded from detailed analysis because it is inconsistent with existing direction in the Bishop Fire Management Plan and because it is not economically or technically feasible at this time. The total acreage that would have to be treated both mechanically and with prescribed fire would far exceed the limits allowed under the Fire Management Plan. It would also require a level of funding that far exceeds both the current and predicted funding levels the Bishop Field Office is likely to see for vegetation management work. Because it would require the treatment of sites that are not likely to have successful outcomes with today's technologies, it would also be technically infeasible.

***1. No Treatment in Areas with Inventoried Wilderness Characteristics***
The No Treatment in Areas with Wilderness Characteristics Alternative would only implement treatments in areas without inventoried wilderness characteristics. This would lower the total maximum treatment area to 7,983 acres (47% of the Proposed Action). During the environmental review, the inventory of wilderness characteristics in the project area was updated. The finding was that units totaling 40,141 acres had wilderness characteristics. This area plus the 54,804 acres of WSAs (Bishop BLM GIS database as of Feb. 2013) which are managed for their wilderness characteristics leaves just 72,155acres in the project area without wilderness characteristics (43% of the total project area). The ecosystem types are not evenly distributed throughout the Bodie Hills so the treatment acreages were adjusted proportionally to the occurrence of that ecosystem type and the target states as shown in the table below.

| Ecosystem type | Maximum acres | % of Proposed Action |
|---|---|---|
| 1. Basin wildrye - big sagebrush | 183 | 52% |
| 2. Low sagebrush | 942 | 46% |
| 3. Montane sagebrush steppe | 4044 | 38% |
| 4. Mountain Shrub | 914 | 91% |
| 5. Wyoming sagebrush – loamy | 692 | 81% |
| 6. Wyoming sagebrush –sandy | 864 | 58% |
| 7. Montane riparian | 25 | 83% |
| 8. Stable aspen | 263 | 53% |
| 9. Wet meadows | 55 | 55% |
| **TOTAL** | **7983** | **47%** |

This alternative was developed to respond to concerns about potential impacts to wilderness characteristics and a request by one of the commenters that an alternative be developed that did not implement high impact techniques in areas with wilderness characteristics.

*Rationale for excluding from detailed analysis*
This alternative was excluded from detailed analysis because it would not meet the purpose and need for action. It would not treat enough of the landscape to maintain or reduce the ecological departure or to minimize the transition to high risk vegetation classes. Only two of the six primary upland ecological systems would be treated at a level that might be able to make a difference in their ecological condition, the Mountain Shrub and the Wyoming sagebrush – loamy ecological systems. Only one of the three associated riparian ecological systems would be treated at a level large enough that it might affect its ecological condition.

## Summary of Alternatives

**Table 1.** Summary of acreages in all alternatives.

| Alternative | Project Area: Acres BLM managed lands (% of Prop. Act.) | Treatment: Acres (% of Prop. Act.) | % of Bodie Hills landscape to be treated [BLM managed] | Approximate acres of treatment in WSA | % of treatment in WSA |
|---|---|---|---|---|---|
| Alt 1: No Action | 0 | 0 | 0% | 0 | 0% |
| Alt 2: Proposed Action | 167,098 | 16,930 | 10% | ~5,392 | 32% |
| Alt 3: Increased Acreage | 167,098 (100%) | 23,880 (141%) | 14% | ~7,403 | 31% |
| Alt 4: CWPP WUI | 102,690 (61%) | 10,268 (61%) | 6% | ~2,935 | 29% |
| Alt 5: Limited treatment in WSA | 167,098 (100%) | 12,903 (76%) | 8% | ~1,645 | 13% |
| Alt 6: No Treatment in WSAs | 112,294 (67%) | 11,288 (67%) | 7% | 0 | 0% |
| **Alternatives not analyzed in detail** | | | | | |
| Alt 7. Community Protection Fuel Breaks | 27,548 (12%) | 3,766 (22%) | 2% | ~452 | 12% |
| Alt. 8: Front-load Scenario | Same as Proposed Action, timing of treatments is the only difference. | | | | |
| Alt. 9: Complete Restoration of FRCC | 167,098 (100%) | 50,432 (298%) | 30% | ~15,634 | 31% |
| Alt. 10: No treatment in areas w/ wilderness char. | 72,155 (43%) | 7,983 (47%) | 5% | 0 | 0% |

## Alternative 1: No Action

No programmatic vegetation restoration program would be implemented. Case by case projects may be approved under separate NEPA analyses, but a landscape scale program would not be implemented. Under the No Action Alternative, on-going management in the Bodie Hills including monitoring programs, continued fire suppression, and all other approved projects and management would continue.

## Alternative 2: Proposed Action

A set of vegetation treatments would be implemented over a 10 year period in the Bodie Hills landscape (see Figure 1). Treatments would be designed and implemented to maintain and restore the natural range of variability and to reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire. The treatments are based on an analysis of the conditions in the Bodie Hills undertaken cooperatively by the BLM and The Nature Conservancy with input from many public stakeholders. The ecological systems and succession classes used here follow the final report (Provencher, Low et al. 2009).

The ecological systems targeted for treatment are primarily the upland types that were found to be at the greatest departure from their natural range of variability and at the greatest risk of conversion to uncharacteristic classes. Uncharacteristic classes are conditions outside of the historic vegetation states and include invasion by invasive plant species such as cheatgrass and pinyon/juniper encroached shrublands. Highly departed or at risk riparian vegetation types that are commonly embedded in the upland matrix or adjacent to it are also included in this proposal. The treatments in riparian systems that are included are only those that would also be used in the adjacent or surrounding uplands and can be applied continuously across both ecological systems. Because many riparian systems have experienced upland encroachment, it would benefit them to be included in the upland treatments such as prescribed burning or cutting pinyon and juniper. The report found that there are some other mechanisms in riparian systems causing departure from the natural range of variability (such as meadow incision and lowered water tables) which require very different management techniques to treat them. Those management actions are not included in this Proposed Action and would be analyzed in site-specific NEPA documents.

The upland vegetation types proposed for treatment under this alternative are:

1. Basin Wildrye-Basin Big Sagebrush
2. Low Sagebrush
3. Montane Sagebrush Steppe
4. Mountain Shrub
5. Wyoming Big Sagebrush-loamy
6. Wyoming Big Sagebrush-sandy

Associated riparian systems to be included in some treatments are:

7. Montane Riparian
8. Stable Aspen
9. Wet Meadows

A description of the vegetation types/ecological systems can be found in Appendix 1of TNC report (Provencher, Low et al. 2009).

Computer simulations were performed to test the effectiveness of various management strategies suggested by public input at the workshops and to adjust the scale of application. The simulations showed that multiple strategies are required for most ecosystems. Upland sagebrush strategies include: prescribed fire; removing and/or thinning increasing pinyon and juniper; establishing fuel breaks along existing roads to prevent wildfire from spreading to human settlements and adjoining ecosystems; and restoration of depleted sagebrush through mowing

and in some locations followed by seeding of native herbaceous species (Provencher, Low et al. 2009).

Of the various management scenarios tested in the analysis, the combined ecologically-based and wildfire protection management scenario meets the conservation and restoration objectives for the least cost for the majority of the priority ecological systems. In addition to ecological benefits, this scenario also reduces wildfire risks to Bodie State Historic Park and nearby human settlements (Provencher, Low et al. 2009). The treatments in this Proposed Action are based on this scenario for an initial 10 year period.

*Site Selection*

Sites would be selected for treatment based on the vegetation conditions as described in the tables below. Only a portion of the vegetation meeting those criteria would be treated. Locations within those ecological system seral classes would be selected based on the ability to meet other objectives and the probability of success using the following principles:

- The highest priority sites will be those where multiple objectives can be accomplished. For example, site selection will prioritize benefits to sage-grouse habitat near leks or where the ecological treatments will also reduce fire risk to communities or cultural resources.
- Sites with the highest probability of success will be selected where the objectives of the treatment can be met. For example, the response of understory species and shrubs is usually much better under lower pinyon-juniper cover (earlier in the tree establishment and infilling process) than under higher cover. Pinyon-juniper cover on shrubland sites is classified in three stages and Stage I sites will have the highest priority for treatment. Other examples of sites with better probabilities of success are those without cheatgrass in the understory where increases in cheatgrass are less likely after treatment.
- Sites will be chosen with the lowest possible conflict with other resource concerns such as visual impacts, potential for OHV incursions, or special status plant populations as described in the Design Features of the project.

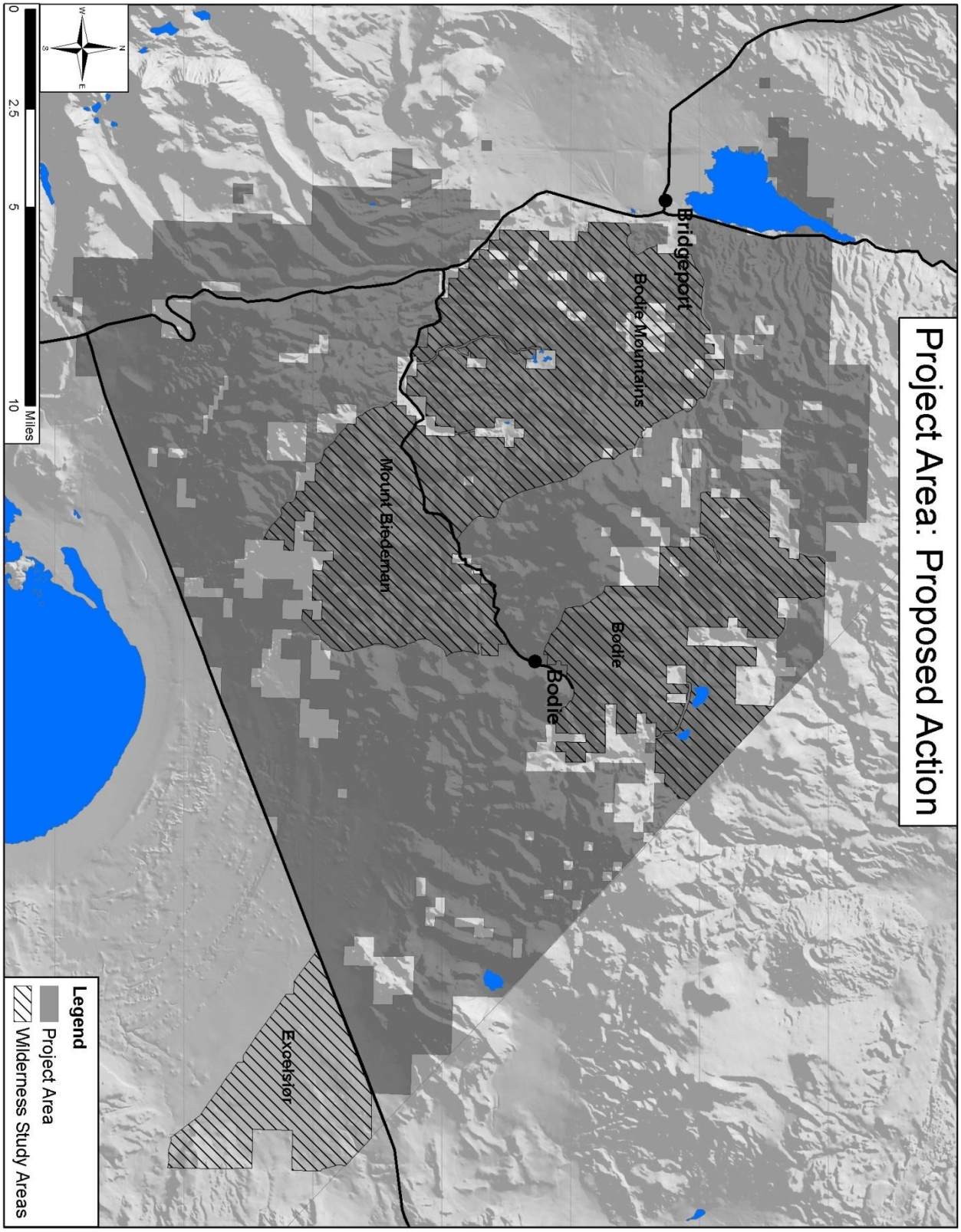


**Figure 3.** Map of the project area for Proposed Action (Alternative 2) and also Alternatives 3 and 5. The project area includes all the BLM lands in the Bodie Hills and west towards the Sierra Nevada. It does not include private inholdings within that area. Treatments would only be applied to a small subset of this area as described in the alternatives.

**Tables 2.1-2.9.** Treatment objectives and acreages by ecological system for Alternative 2 (Proposed Action).

## Upland Treatments

| **2.1 Basin Wildrye – Big Sagebrush** | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving ecological condition of Bodie Hills basin wildrye from 73% departure from NRV to 50% departure or less and reducing depleted classes by 50%. Prevent any increase of exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late seral basin wildrye and classes lacking native herbaceous cover to convert them to early development classes (A and B). | Late seral-open (D), Shrub-Annual grass (U ShAG), Annual grass (U Ag)* | 230 | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed fire |
| II. Prevent conversion to pinyon/juniper by treating early establishment stages. | Late-open (D), Tree-encroached (U TrEnc), Tree-Annual grass (U TrAG)* | 120 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **350** | |

*Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives. See adaptive management strategy.

| **2.2 Low Sagebrush** | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of maintaining ecological condition of low sagebrush at ~40% departure from NRV or less and limiting increase of high-risk (tree encroached and annual grasses) classes to 10% or less. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Remove trees from later successional stages. | Late-open (E), Mid-open (B), Tree encroached (U TrEnc) | 1250 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| II. Treat classes with an annual grass component to prevent increase.* | Annual grass (UAG) , Shrub-Annual grass-Perennial grass (U ShAP) | 800 | -Seeding native species<br>-Mowing, hand cutting or spot burning shrubs where necessary for establishment |
| **Maximum acres of vegetation treatment** | | **2050** | |

*Strategy II was added to the scenario analyzed in the Provencher, Low et al. 2009 report because California BLM does not have the option of using effective herbicides on annual grasses and this is the most effective strategy to minimize annual grasses without the use of chemicals. The area to be treated over 10 years was derived from the acres of annual grass mapped in the analysis. Treatment of those acres should limit the increase of annual grasses, however, the amount in the U ShAP class was likely underestimated because the current sites are small and hard to detect with remote sensing.

| **2.3 Montane Sagebrush Steppe** | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving the ecological condition from high departure (72%) from NRV to moderate departure (~55%) and limiting increase in highest risk classes to 20% or less. Establish a fuel break around Bodie State Historic Park that will also provide ecological benefits by increasing early successional classes. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional, depleted, and annual grass invaded classes to convert them to early development classes with greater native herbaceous cover. | Mid-closed (C) Late-open (D), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 9500 | -Broadcast prescribed burning<br>-Mowing<br>-Hand cutting small pinyon/juniper**<br>-Seeding native species in the most depleted/high risk sites if necessary |
| II. Remove trees from classes with increasing pinyon/juniper to prevent and reduce conversion. | Late-open (D), Late-closed (E), Tree encroached (U TrEnc), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP), Shrub-Annual grass (U ShAG) | 750 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| III. Construct and maintain a 300 ft. fuel break around structures and values at risk (ex. Bodie State Park) to reduce fire risk and increase early development classes. This may include both BLM and State lands. | Several classes – site selection depends on location, not class. | 300*** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed burning<br>-Seeding native species if necessary |
| **Maximum acres of vegetation treatment** | | **10550** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives.
**Early stages of pinyon/juniper establishment are difficult to map with aerial photography. Small trees may occur in class C and D. A minimum of 2000 acres of "shrub" treatment in the montane sagebrush system will be removal of conifer trees.
*** Fuel break acres will be periodically maintained to keep fuel loading low.

| **2.4 Mountain Shrub** | | | |
|---|---|---|---|
| **Objective:** Improve the ecological condition from moderate departure (39%) from NRV to low departure (~25%).* | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late developmental classes to return them to early developmental classes. | C (late-closed) and D (Late-open). | 1000 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **1000** | |

*The Mountain shrub ecological system was not identified in the report as one of the highest priorities for treatment so the objectives for managing this system were not explored in detail. The Bishop Field Office chose to add this system and create management objectives for it because it has a high probability of success and can be included with adjacent ecosystems in prescribed burns.

| **2.5 Wyoming big sagebrush – loamy** | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving ecological condition from highly departed (~74%) to moderately departed (<66%) and reducing the risk of wildfire spreading to adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late development classes in fuel breaks mostly arranged along roads to return them to early development classes and reduce the fuel load and continuity. | Late-closed (C), Late2-open (D), Late2-closed (E), Depleted (U DPL), other classes as necessary to complete fuel break. | 250** | -Mowing<br>-Seeding native species |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 600* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **850** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 600 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

| **2.6 Wyoming big sagebrush – sandy** | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goal of improving ecological condition by a small percentage (5%) while reducing risk of wildfire spreading into adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Create fuel breaks mostly arranged along roads to convert to early developmental classes and reduce fuel load and continuity. | Many; site selection depends on location rather than class but majority of area will be in Depleted (U DPL), Late-closed (C), Late2-open (D), Late2-closed (E). | 500** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Seeding native species if necessary |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 1000* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **1500** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 5670 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

## Associated Riparian Treatments

| **2.7 Montane riparian** | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the riparian habitat at less than ~33% departure from the natural range of variability. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages and reverse or prevent conversion to upland woody species. | Late-closed (E), Shrub-Forb-Encroached (U SFEnc) | 30 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **30** | |

| **2.8 Stable aspen** | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of improving the ecological condition from 41% departure from the natural range of variability to ~33% departure and reduce "no aspen" classes by ~50%. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages, reverse or prevent conversion to upland species, and promote healthy aspen regeneration. | Late1-closed (E), Late1-open (D), Depleted-open (U DPL), No aspen (U NAS) | 500 | -Broadcast prescribed burning<br>-Hand cutting pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **500** | |

| **2.9 Wet meadows** | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the ecological condition of wet meadow at less than 33% departure from the natural range of variability and preventing any increase in exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat areas of iris or sagebrush to convert them to early seral classes. | Shrub-Forb encroached (U SFEnc), Desertification (U DES), Tree encroached (U TrEnc) | 100 | -Broadcast prescribed burning* |
| **Maximum acres of vegetation treatment** | | **100** | |

* Other methods were recommended in the report in addition to broadcast burning. Those methods are outside the scope of this analysis because they are not among the tools also being used in the uplands.

## Sum of All Ecological Systems:

| | |
|---|---|
| **Total maximum acres of vegetation treatment across all ecological systems*** | **16930** |

* Does not include maintenance of established fuel breaks or weed treatments.

## Methods

***Broadcast prescribed burning***

The controlled application of fire broadcast across a predetermined unit to consume a percentage of the vegetation. Resource management objectives are achieved by applying fire during specific environmental conditions and by some preparation of the site to control spread or protect islands within the burned area for protection of cultural or natural resources. Prescribed burning will be used to consume shrubs in a mosaic pattern and small trees and ladder fuels. Unit boundaries will be designed to follow natural and existing features as much as possible. In shrub treatments where the objective is not to consume pinyon or juniper trees, burning will be done in small patches across the landscape when fuel moisture conditions are high to provide small openings with a natural appearance and avoid the use of fire line to control the edges of the fire. Prescribed burn units in sage-grouse habitat will not exceed 124 acres where possible. The goal of these treatments would be to create a mosaic of treated and untreated areas with several small (approximately 1-2 acre) treated patches among the existing brush. The conditions under which burning will take place to achieve the ecological and resource protection goals and to provide for safety will be specified in a prescribed burn plan written by a qualified burn boss. Some preparation of the site may be necessary before burning including wetlining, blacklining, hand cutting or mowing, or handline construction with hand tools. Tools such as drip torches and fusees and other firing devices will be used to ignite the fire. Where necessary, fire will be controlled with blacklining, water (engines where there are existing roads or bladder bags) and hand tools. The specific tools and methods will be determined by the qualified burn boss to allow for effective implementation and safety. Using adaptive management, the season of burning may be adjusted and the results monitored for cheatgrass response to test the possibility of using timing of burning to reduce risk of cheatgrass spread.

***Spot burning of shrubs or trees***

The same as broadcast burning treatments above, but only isolated shrubs or trees are ignited so that the fire does not carry or spread on its own. Each shrub or tree is ignited individually. Minor control methods may be needed if fire begins to carry including the use of hand tools or water to extinguish the fire.

***Mowing shrubs***

The use of a Bobcat™, ASV™ (a compact track loader), or similar-sized machine with low ground pressure (less than 10 psi) equipped with a mower or other appropriate attachment to mow and mulch shrubs and small trees. Chips remain on the ground. The height of mowing can be controlled to leave a percentage of existing shrub cover. Mower head height will be high enough to leave residual vegetation and avoid any impact to the soil except where the purpose of the treatment is a fuel break close to homes. Mosaic patterns and unit boundaries that follow natural features will be used wherever possible. Mowing units in sage-grouse habitat will not exceed 124 acres where possible. The goal of these treatments would be to create a mosaic of treated and untreated areas with several small (approximately1-2 acre) treated patches among the existing brush.

***Hand cutting shrubs***

The use of chainsaws to hand-cut shrubs, usually in a mosaic pattern so that small patches or a percentage of the vegetation are left uncut. Mechanical treatment (mowing and hand cutting)

units in sage-grouse habitat will not exceed 124 acres where possible. The goal of these treatments would be to create a mosaic of treated and untreated areas with several small (approximately 1-2 acre) treated patches among the existing brush. The resulting slash would be piled and burned or chipped depending on the access and resource concerns (See piling and burning and chipping method descriptions and selection criteria below).

***Hand cutting pinyon/juniper***
The use of chainsaws to remove or thin pinyon and juniper moving into shrubland sites. Young (post Euroamerican contact) pinyon/juniper would be removed, but older pinyon/juniper will be maintained. Visual features of the trees as described in USGS Circular 1335 *(Pinyon and Juniper Field Guide: Asking the Right Questions to Select Appropriate Management Actions)* would be used to identify older trees (Tausch et al. 2009). This will result in a mosaic on some sites. No true pinyon-juniper woodlands would be treated. A written prescription will guide treatment implementation and selection of trees to be cut.

Collection and use of material such as fuel wood and Christmas trees would be allowed where feasible and consistent with the Bishop RMP (USDI BLM 1993a) and current BLM policy for management of Wilderness Study Areas. Public fuelwood collectors would not be allowed to drive off existing routes. Any remaining slash (tree limbs and boles) will be treated with one of two methods depending on access and resource concerns (See Piling and burning and chipping method descriptions and selection criteria below) or could be removed off site for disposal.

***Piling and burning***
Slash will be piled by hand and burned under favorable conditions once the slash has cured. The locations of piles will be carefully selected. Where possible, piles will be constructed in natural openings, on top of cut pinyon/juniper stumps where trees have been removed, and outside areas with high annual grass density. Piles will be constructed at least 10 feet from any remaining tree and piles will be no greater than 5 feet high and 10 feet in diameter by the time they are burned. A prescribed burn plan written by a qualified burn boss will be followed.

***Chipping***
Slash will be chipped with a mechanical chipper. The chips will either be blown back onto the site at a depth no greater than 2 inches or hauled off the site. Chippers will not be used off existing routes.

***Seeding native species***
A native species mix appropriate for the site and collected locally when possible would be used in situations where recruitment of natives is not occurring indicating a depleted native seed bank or where strong competition from natives is necessary to limit annual grass abundance. Seeds will be certified “weed free.” Seeding will be done by any accepted method including hand or rangeland drill (see method selection criteria below).

## Method Selection Criteria

The methods used will depend on the current vegetation state and the action necessary to move to the desired vegetation as described in the treatment tables above. Where there is a choice of treatment methods, the treatment most likely to achieve the desired vegetation state and cause the

least disturbance to other resources or risk of adverse outcomes (i.e. cheatgrass) will be used. The following criteria describe some of the situations where one treatment will be favored over another:

***Prescribed burning***

- The preferred method where the goal is to return the site to an early seral state (with low shrub cover) especially in WSAs or areas with inventoried wilderness characteristics.
- Would not be the preferred treatment method where the risk of annual grass increase is high (sites with existing annual grasses, south facing slopes and loamy soils) or other high risk classes.
- Would not be used where there is not enough surface fuel to carry a broadcast fire (i.e. late stages of pinyon/juniper conversion where understory is depleted or in habitats such as low sagebrush with very little surface fuel).
- Could be used on any terrain.
- Would not generally be used in close proximity to structures and communities. Will be used where the Fire Management Officer determines that it can be done without undue risk.

***Spot burning trees or shrubs***

- Would be used where the goal is to reduce or eliminate shrub or tree cover without disturbing the herbaceous understory.
- Would be one of the preferred methods where variable shrub cover and mosaic patterns are important especially in sage-grouse habitat, areas with complex vegetation patterns, high visual concerns, and in WSAs or areas with inventoried wilderness characteristics.
- Could be used on any type of ground including areas with poor access, steep topography, and rocky uneven surfaces.
- Preferred over broadcast burning where fuel loads are too low to carry fire.
- Would not be preferred in areas with especially high cheatgrass risk.
- Would not generally be used in close proximity to structures and communities. Will be used where the Fire Management Officer determines that it can be done without undue risk.

***Mowing***

- Would be used where the goal is to reduce but not entirely remove shrub cover, remove small trees from the early stages of pinyon/juniper establishment, and not disturb the herbaceous understory. The resulting vegetation state would typically be class B-C.
- Used only on gently sloping (<15%), non-rocky areas.
- Would be one of the preferred methods (see also hand cutting) in areas of sage-grouse nesting or wintering habitat where maintaining some sagebrush cover is important.
- Would be one of the preferred methods (see also hand cutting) instead of broadcast prescribed burning where the risk of increasing annual grasses is high.
- Would be one of the preferred methods (see also hand cutting) instead of broadcast prescribed burning where there are fire control concerns especially near structures.
- Would be the least preferred method in WSAs.

***Hand cutting shrubs***

- Would be used where the goal is to reduce or eliminate shrub cover and not disturb the herbaceous understory.
- Would be a preferred method where variable shrub cover and mosaic patterns are important especially in sage-grouse habitat, areas with complex vegetation patterns or high visual concerns.
- Could be used on any type of ground including areas with poor access, steep topography, and rocky uneven surfaces.
- More labor intensive than broadcast prescribed burning or mowing.
- Preferred over broadcast burning where there are fire control risks.
- Preferred over broadcast burning where the risk of annual grass increase is high.

***Hand cutting pinyon/juniper***

- Would be used where larger trees need to be removed that would not be likely to be consumed during prescribed broadcast burning.
- Would be used where there are increasing pinyon and juniper and the goal is to maintain shrub cover, for example in sage-grouse habitat.
- Would be applied primarily in the earlier stages of pinyon and juniper expansion where trees are smaller and densities are lower and there is less slash to dispose of. These earlier stage areas have the best outcomes and are usually the leading edges of the tree expansion. Late stage expansion with closed canopies and large trees would only rarely be treated where outcomes are expected to be good and where another value is achieved by the treatment, fuel reduction near communities, important wildlife habitat restoration, or protection of culturally important true woodland groves as examples.
- Could be used on any type of ground including areas with poor access, steep topography, and rocky uneven surfaces.

***Piling and burning***

- Would be the preferred method of slash disposal after hand cutting of shrubs or trees.
- Could be used on any terrain.
- Would not be used where there is a high risk of increasing annual grasses in the burn pile footprint and chipping is a viable alternative (close to roads).
- Would not be the preferred method where visual impacts from key observation points would be undesirable and chipping is a viable alternative (close to roads).

***Chipping***

- Would be preferred method of slash disposal close to roads where visual impacts of piles would be high, or where the risk of increasing annual grasses is high.
- Could only be used where road allows access for the chipper.

***Seeding methods***

- Seeding would only be done if the local native seedbank does not respond after treatment OR due to the site conditions there is an elevated concern that the native seedbank would be insufficient to prevent a substantial increase in cheatgrass or other invasive plants.
- Hand seeding will be preferred.

- A rangeland drill will not be used in WSAs or areas with inventoried Wilderness Characteristics.
- Fuel breaks in areas with annual grass may be seeded using a rangeland drill.

## Design Features

The following design features will be used to minimize negative effects of the treatments on other resources. Some design features are required by existing plans and BLM direction including the Bishop Resource Management Plan (Bishop RMP) (USDI BLM 1993a), the Amendment to the Bishop Resource Management Plan to Incorporate Fire Management Plan Strategies and Objectives (Fire Management Plan) (USDI BLM 2005a, USDI BLM 2005b), and the BLM Manual for Management of Wilderness Study Areas (6330)(USDI BLM 2012e).

***Air quality***

- Prior to prescribed fire operations, appropriate permits would be obtained from Great Basin Unified Air Pollution Control Board (GBUAPCB).
- "Burn" or "No Burn" day conditions would be adhered to, as determined by the California Air Resources Board (CARB).
- Degradation of air quality in Class I Airsheds would be minimized by conducting prescribed fire operations when meteorological conditions favor smoke dispersal away from these areas.
- Prescribed fire operations would be conducted when meteorological conditions favor minimal nuisance smoke in communities.

***Cultural Resources***

- Cultural resources within the proposed project area will be identified and evaluated prior to project approval for the individual treatment units. This will be accomplished through a records search of previously identified resources, tribal consultation, and an intensive cultural resource survey within the Area of Potential Effect (APE). Formal tribal consultation will be initiated early in the planning process in order to identify Traditional Cultural Places, Sacred Sites, and properties of traditional and religious significance to the tribes. The findings from these identification efforts will be evaluated and documented in a Cultural Resource Inventory Report consistent with BLM guidelines.
- Following the identification and evaluation of cultural resources within the proposed project area protection measures will be implemented in order to mitigate potential impacts to cultural resources below the threshold of an adverse effect. These efforts will emphasize avoidance through project redesign but may also include site specific protection measures. The scheduling of proposed treatments will be designed to not impede Native American access to ceremonial sites or areas of traditional use.
- A combination of site specific Standard Resource Protection Measures (SRPM) may be used to protect cultural resources during project implementation. These measures are consistent with those detailed in the Supplemental Procedures for Sage Steppe Ecosystem Restoration (USDI BLM 2014d) to the CA BLM Protocol Agreement (USDI BLM 2014c). Site location information and SRPM prescriptions shall be conveyed in writing and depicted on maps by the Field Office Cultural Resource Staff to the Project Planner.

Active monitoring of SRPM during the proposed activity will be used to determine protection measure effectiveness and to guide future protection strategies.

- SRPM for vegetation management will include but not be limited to the following:
    - Flag and avoid with buffering (establish protective boundary), edge feathering / gradual reduction of vegetation.
    - Lop and scatter with constraints on heavy fuel loads left on archaeological sites.
    - Hand treatment on archaeological sites in areas of heavy/dense vegetation where the hand treatment will not impact archaeological data associated with the site.
    - Areas may be left untreated where high site densities of archaeological sites have been identified.
    - Mechanical treatment on archeological sites with prescriptions; high-mow (10-12 inches aboveground) or combination of partial mechanical and hand treatments.
- SRPM for Prescribed Fire/Broadcast Burning will include but not be limited to the following:
    - Cultural resources may be protected by creating fire breaks that provide a sufficient buffer to ensure that resources are not impacted by fire.
    - Mechanical equipment may be used to create fire breaks or grade existing roads only if the areas to be graded have been examined by a cultural resource specialist and found not to contain archaeological or historical resources.
    - Fire shelter fabric may be used to protect cultural resources from radiant heat.
    - Fire retardant foam wetting agents without dyes or colorants may be applied to the perimeter surrounding cultural resources.

***Invasive Plants***

- Treatment units will be surveyed for invasive plants (see Glossary for definition) prior to the area being treated.
- Invasive plant surveys: The first component of an early detection, rapid response (EDRR) strategy for preventing new infestations of invasive plants into a landscape. Target ecological systems will be surveyed for occurrences of invasive plants such as cheatgrass (*Bromus tectorum*), muskthistle (*Carduus nutans*), knapweed (*Centaurea* spp.), Canadian thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), perennial pepperweed (*Lepidium latifolium*), whitetop (*Cardaria* ssp.), salt cedar (*Tamarix ramosissima*) and other plants recognized by the Eastern Sierra or Walker River Basin Weed Management Area as species of concern. Currently the species listed above are known to occur very sparingly or not at all in the Bodie Hills. Non-native species such as tansy mustard (*Descurainia sophia*), wooly mullein (*Verbascum thapsus*) and tumble mustard (*Sisymbrium spp.*) are not currently considered invasive in the Bodie Hills and are not specifically targeted for treatment. These species will be documented if encountered in target ecological systems and if infestations become invasive they will be treated as indicated below.
- If occurrences of invasive plants are detected, appropriate eradication measures will be implemented, as determined by interdisciplinary effort (Bishop Fire Management Plan pg. 53 (USDI BLM 2005b).
- If units are infested with invasive plants methods will be modified as necessary based on a risk assessment conducted by a BLM interdisciplinary team. Modifications would include avoiding prescribed burning in units where cheatgrass is common throughout the

unit, using a different treatment method (see Method Selection Criteria above), treating the infestation before or after treatment, or moving the treatment to a different site.

- Invasive plant treatment: The second component of an EDRR strategy for preventing new infestations of invasive plants into a landscape. Treatments will be conducted using physical treatment methods. Physical treatment may include; hand pulling; use of manual hand tools (loppers, shovels, rakes, pulaskis, etc.), tarping, use of motorized hand-held tools (gasoline powered weed whips/weed eaters, etc.) or mowing. Treatment may occur repeatedly over several years to achieve control. Effective (and reasonable) treatment of some infestations may only be accomplished with the application of herbicides. The use of herbicides is not included in this Proposed Action, but will be used where necessary if approved in a separate NEPA analysis.
- Invasive plant treatments prescribed for specific ecological systems do not include treatment of annual grasses such as cheatgrass or red brome, unless there is a high probability of success given the constraints of the above treatment options. Elsewhere in the Great Basin, cheatgrass treatment methods and success have been both varied and inconsistent. Some pre-emergent selective herbicides have been successful however these herbicides are not permitted for use in California by the BLM.
- Equipment used from outside the area will be inspected and cleaned to remove remnant soil or vegetation material prior to the equipment being used in the project area.
- Any equipment moved from an infested area to a non-infested area will be cleaned. If a unit has documented invasive plants in one portion, that portion will be treated last to avoid spreading non-native invasive plants throughout the treatment area.
- Post-treatment surveys will be conducted to detect increases in invasive plants. If non-native species cover increases due to the treatments, appropriate control measures will be implemented, as determined by interdisciplinary effort according to the standards in the Bishop Fire Management Plan (USDI BLM 2005b).
- Using Adaptive Management, if elevated levels of non-native species are detected in post-treatment surveys, future treatments will be modified to help prevent increases in non-native species due to treatment methods or locations.

***Range***

- The BLM will consult and coordinate with range permittees in the design, layout and timing of the treatments.
- Treatment units will be rested from grazing. The extent of the rest depends on the treatment method and vegetation response. In general, mechanical vegetation treatments will be rested 2 growing seasons following treatment (Bishop RMP pg. 11). Prescribed burn treatments will be rested from grazing for 3 growing seasons following treatment (Bishop RMP pg. 12). The extent of the rest, if different from the standard due to vegetation response, will be determined by the Bishop Field Manager based on an interdisciplinary process. The BLM will work with permittees so that rest from livestock can be accommodated with as little impact to their grazing operation as possible.
  Tools that will be used to exclude grazing after treatment include temporary electric fencing, active herding, and shutting off nearby water sources. If the tool chosen is not effective in preventing grazing in the unit, it will be modified.
- Any subsequent infrastructure and/or projects (e.g. fencing) to aid in resting treatment areas will be analyzed in a separate NEPA document.

***Recreation***

- Fire control lines will be rehabbed and barriers will be installed where necessary near roads and trails so that they are not used as OHV trails.
- Mowing treatments will leave a buffer of untreated vegetation along the road to reduce unauthorized access by OHVs except in treatments that are designed along roads as fuel breaks. Fuel breaks will not be implemented in VRM Class 1 areas or in WSAs.

***Sensitive plants***

- The terms *Special Status Plants* and *BLM Sensitive plants* (Sensitive plants) are explained in the Environmental Effects chapter, Background of Issue 7 of this document.
- Prior to treatment, units will be analyzed for the presence of known or suspected occurrences of Sensitive plants as well as for potential habitat for Sensitive plants. Potential habitat will be surveyed before treatment. Surveys will be conducted at times appropriate for proper identification of species. Survey intensity will be of a level appropriate to the probability of occurrence of a given species. Survey intensity will also be based on the expected level of disturbance within a treatment unit
- Sensitive plants that occur within treatment units will be assessed by the BLM for inclusion or exclusion from treatment. Examples of factors that will be considered during the assessment are: the number of known occurrences in the Bodie Hills as well as the number of occurrences in the surrounding area; the number of plants at the given occurrence as well at other occurrences; the habitat type the occurrence is present in and the condition of the habitat; the type of treatment that would be the preferred method for that treatment unit; etc.
- Based on the assessment, the BLM will modify treatments as seen fit to prevent adverse impact. While it is not the primary objective of treatments, when possible, treatments will be carried out in a manner that would maintain or improve Sensitive plant habitat.
- Treatment modifications may include but are not limited to: establishment of exclusion areas to prevent Sensitive plants from being mowed, burned, piled or chipped directly onto or adjacent to; altering the treatment method near Sensitive plant occurrences (e.g., mowing instead of burning around an occurrence); etc.
- Post-treatment monitoring of Sensitive plants within treatment areas.
- Using Adaptive Management Strategies, if evidence is found during the project implementation period of a positive (or negative) relationship of any Sensitive plant with including or excluding the species from treatment, then the methods would be altered to benefit/protect the Sensitive plant species. For example, if a wildfire burns through an occurrence and there is a positive response, then that species would be considered for prescribed burn treatments in future treatments.
- If Sensitive plant species are found in the project areas which are not listed in Issue 7, they will be added and design features will be determined through an interdisciplinary effort with input from the field office botanist.
- While conducting inventories for Sensitive plants, those species that are on the California Native Plant Society (CNPS) list 2 and 4 will also be surveyed for. If CNPS list 2 or 4 plants are found to occur within a treatment unit they will be evaluated similarly to BLM Sensitive plants.

***Soils/Hydrology***

- The treatments are designed to meet the requirements of the Lahontan Regional Water Quality Control Board (LRWQCB) timber waiver regulations including the following design features:
- Mechanical equipment and vehicles will not be used off existing roads or routes on wet or poorly drained or erosive soils (Bishop RMP pg. 13). Only low ground pressure vehicles such as mowers will be used off existing routes.
- Public fuelwood collectors will not be permitted to drive off existing routes.
- Piles in the water body buffer zone (generally 75 ft. from the stream bank depending on the slope and type of watercourse, see definitions in the LRWQCB Timber Waiver) will not be located on the 100 year floodplain or within 25 ft of the stream. The piles will be less than 10 ft in diameter and 5 ft. high when they are burned and will not cover more than 10% of the area. They will be a minimum of 10 ft from any other pile or tree.
- Broadcast fire will not be actively ignited in the water body buffer zone but can be allowed to move into it passively.
- If fire lines are used to contain broadcast fire, they will be evaluated afterwards for risk of erosion. If there is a risk of elevated erosion they will rehabbed to and waterbars installed where necessary.
- Chipped material that is blown back onto the site will not exceed an average depth of 2 inches in water body buffer zones.
- Mower head height will be set high enough to prevent soil disturbance and leave some residual vegetation.

***Visual resources***

- Treatments will be designed to conform to the appropriate VRM Class as designated in the Bishop RMP. A visual contrast rating will be conducted for each treatment unit when it is designed to ensure conformance with VRM standards. The methods to be used to ensure conformance with visual standards are listed below:
- Units will use irregular sinuous or curvilinear patterns (not straight line) following natural vegetation and topographic boundaries as much as possible, and islands of vegetation will be left to create a mosaic (Bishop RMP pg. 11). Where possible, the amount of vegetation removed will be graduated or “feathered” into the non-treated area. The treatment methods where this would be appropriate are primarily hand treatment methods. These design features also benefit wildlife and wilderness character (See wildlife and WSAs). (Note: The linear fuelbreaks along roads that are proposed in the Wyoming sagebrush ecosystem do not occur in VRM 1 areas. These fuel breaks will also use irregular edges but will by necessity be a linear feature that follows roads or boundaries.)
- Where a treatment unit design initially does not meet VRM class objectives, the size, shape, and location can be modified to reduce visual contrast from the Key Observation Points. Likewise, treatment methods or season of treatment can be modified where desired conditions can still be met. Treatment units can be broken into multiple smaller units across the areas. Prescriptions can be written to reduce the amount of vegetation to be removed.

***Wild and Scenic River Study Segments (Eligible)***

- No hand cutting of trees will be used within ¼ mile of the ordinary high water mark in the segment of Rough Creek that was determined in the Bishop RMP to be eligible for possible inclusion in the National Wild and Scenic River System and tentatively classified as Wild. (BLM Manual 6400 p. 3-12). Prescribed burning methods can be used.

***Wilderness Study Areas***

- Methods that are least disturbing to the site (BLM Manual 6330 1.6.C.2.f) will be chosen where they will achieve the goals for the ecological system and vegetation class as described in the methods section. Prescribed burning will be used where it can accomplish the desired ecological restoration. If prescribed burning will not accomplish the ecological restoration necessary, the other methods described will be used as described in the methods section.
- Surface disturbance as defined in BLM Manual 6330 (1.6.C.1.b) will not be allowed in wilderness study areas except to protect or enhance wilderness characteristics or values as consistent with the exception to the non-impairment standard at 1.6.C.2.f of BLM Manual 6330. No new roads or routes will be created, and no vehicles will be used off existing roads and routes. Broadcast prescribed burning will use prescriptions that do not require cutting line whenever feasible. Broadcast burn units will use natural and existing features for control, and use Minimum Impact Strategies and Techniques (MIST) to limit ground disturbance.
- Collection and use of material such as fuel wood and Christmas trees would be allowed only where feasible and consistent with the Bishop RMP and current BLM policy for management of WSA, and no off route vehicle travel would be allowed. Current WSA policy does not allow for personal fuelwood collection.
- Trees will be low cut (less than 4”) to minimize visual impacts in the WSAs.
- Rangeland drills will not be used for seeding in WSAs.
- Linear fuel breaks along roads will not occur in WSAs.
- See also visual design features for methods that will reduce visual impacts and wildlife design features for methods that will limit size and encourage mosaics for habitat purposes.

***Areas with inventoried wilderness characteristics***

- In inventory units having wilderness characteristics, broadcast prescribed burning will use prescriptions that do not require cutting line whenever feasible. Broadcast burn units will use natural and existing features for control and utilize Minimum Impact Strategies and Techniques (MIST) as much as possible to limit ground disturbance.
- Trees will be low cut (less than 4”) to minimize visual impacts in inventory units having wilderness characteristics.
- Rangeland drills will not be used for seeding in inventory units having wilderness characteristics.
- See also visual design features for methods that will reduce visual impacts and wildlife design features for methods that will limit size and encourage mosaics for habitat purposes.
- All the above design features will also be applied to the Cedar Hill acquisition which was found to have wilderness characteristics.

***Wildlife***

- Treatment units will use irregular patterns to create more edge and islands of vegetation will be left for cover (Bishop RMP pg. 11). Units will be designed to be small enough to provide good edge and cover habitat nearby for wildlife species such as sage-grouse and to provide nearby seed sources for native vegetation recruitment. Prescribed burn and mowing units in sage-grouse habitat will not exceed 124 acres where possible[2]. These features will also benefit visual and botanical resources.
- Treatments removing tree cover within 2 miles of active sage-grouse leks will be prioritized to create habitat with optimum characteristics for sage-grouse (Bishop RMP pg. 17). Treatment methods least disturbing to the stand of sagebrush will be used if the sagebrush stand meets sage-grouse habitat needs such as hand cutting expanding pinyon without disturbing the shrub layer or mowing with a high mower height to leave enough sagebrush cover.
- Alteration of Wyoming sagebrush habitats involving removal of sagebrush cover (both treatments and other disturbances such as wildfire) will not exceed the guideline to alter no more than 6% of Wyoming sagebrush in a decade[3]. The Proposed Action will treat only 2.4% of currently mapped Wyoming big sagebrush, and if other disturbances such as wildfire alter the habitat type the total treatment acres will be adjusted to stay below the 6% guideline or eliminate treatment alterations in the case of natural disturbances above the threshold.
- Alteration of mountain big sagebrush habitats involving removal of sagebrush cover (both treatments and other disturbances such as wildfire) will not exceed the guideline to alter no more than 10% in a decade[4]. The Proposed Action will treat a maximum of 8.2% of currently mapped mountain big sagebrush, and if other disturbances such as wildfire alter the habitat type the total treatment acres will be adjusted to stay below the 10% guideline or eliminate treatment alterations in the case of natural disturbances above the threshold.
- In sage-grouse winter habitat, treatments involving removal of sagebrush cover will not exceed 10% of the area in a decade[5]. Treatment areas will be adjusted if other disturbances such as wildfire remove sagebrush cover during the time period.
- The proposed total treatment area of 16,930 acres in all vegetation and habitat types is well within the maximum of 23,899 acres (15% of the Bridgeport Valley and Bodie Hills

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[2] Adapted from Connolly, J. W., M. A. Schroeder, A. R. Sands and C. E. Brown (2000). "Guidelines to manage sage grouse populations and their habitats." Wildlife Society Bulletin **28**(4): 967-985. “Discourage prescribed burns > 50 ha”.

[3] Adapted from the guidelines to manage sage-grouse populations and their habitats (Connelly et al 2000). “When restoring habitats dominated by Wyoming big sagebrush, regardless of techniques used (e.g. prescribed fire, herbicides), do not treat >20% of the breeding habitat (including areas burned by wildfire) within a 30 year period.”

[4] Adapted from the guidelines to manage sage-grouse populations and their habitats (Connelly et al 2000). “When restoring habitats dominated by mountain big sagebrush, regardless of techniques used (e.g. fire, herbicides), treat ≤20% of the breeding habitat (including areas burned by wildfire) within a 20 year period.”

[5] Adapted from the guidelines to manage sage-grouse populations and their habitats (Connelly et al 2000). “[D]o not burn >20% of an area used by sage-grouse during winter within any 20-30 year period (depending on the estimated recovery time for the sagebrush habitat).”

Management areas) to be treated over 10 years (Bishop Fire Management Plan, pg. 24, 53). If wildfire acres exceed the fire management plan goal of 3,182 acres during the 10 year period, the acreages of treatments will be adjusted to account for those burned in wildfire (Bishop Fire Management Plan pg. 51). Acres in the target ecological systems that have been burned by wildfire will be considered treated and subtracted from the treatment targets.

- Treatments in sage-grouse habitat will conform with direction in the Bishop RMP and incorporate recommendations from the Bi-State Action Plan for Conservation of the Greater Sage-Grouse Bi-State Distinct Population Segment (Bi-State Technical Advisory Committee 2012a).
- No treatments would occur from 3/1 to 7/30 within 5km or 3.1 miles of an active lek. This distance may be altered to a minimum of 2 miles from a lek or increased, if ongoing analysis of nesting data determines that yearlong protection as provided in the RMP is met with a different distance.
- To reduce impacts to migratory birds, the project analysis and implementation will follow the guidance in the April 12th, 2010 MOU between the BLM and the US Fish and Wildlife Service (BLM MOU WO-230-2010-04) to promote the conservation of migratory birds. Conservation measures could include avoiding treatments during nesting season or surveying prior to treatment and creating buffers around nests to avoid impacts to breeding birds.
- To improve habitat for pinyon jays and other pinyon dependent birds, the edges of treatment units should be feathered, avoiding sharp-well defined linear edges (GBBO 2010).
- No treatments would occur in Sierra Nevada bighorn sheep critical habitat.
- Treatments in areas where Sierra Nevada bighorn sheep may occur would be limited to treatments that would have either no effect or long-term beneficial effects on bighorn.
- In areas of suitable pygmy rabbit habitat, burrow surveys will be conducted before implementation of treatments that may adversely affect pygmy rabbit habitat. To protect and improve habitat for pygmy rabbits, exclusion areas would be identified where surveys have identified extant pygmy rabbit populations and/or burrow systems that may be adversely affected by proposed treatment activities. No broadcast burning or piling and/or pile burning would be allowed in areas identified for exclusion.

***Monitoring Plan***

- A subset of the treatment units will be selected in the Bishop BLM-Inyo National Forest Interagency vegetation treatment monitoring program to be monitored for effectiveness (fuel load, vegetation structure and composition). (Bishop Fire Management Plan pg. 147-151). The Bishop BLM-Inyo National Forest Interagency Vegetation Treatment Monitoring Program document is available on file at the BLM Bishop Field Office.
- Treatment units will be surveyed after implementation for non-native species (see Invasive Plants design feature).
- Sensitive plant occurrences within treatment units will be monitored following treatment.
- Any post prescribed burn cultural surveys will be done if they were identified during unit layout as needed based on site sensitivity (see cultural resources).
- Where monitoring shows that the desired conditions as described in the selected alternative are not being achieved, the treatment methods, locations or amounts will be

modified in the future. For example, if the cheatgrass densities are higher than the range described in the desired vegetation state, the conditions associated with that increase will be identified. If treatment method appears to be one of the conditions associated with the increase, the methods will be modified to prevent increases due to future treatments. If the treatment modifications required are outside the conditions already analyzed in this EA, then additional NEPA will have to be completed.

## Alternative 3: Increased Acreage

The goal of the Increased Acreage alternative is to treat the maximum allowable acreage to improve the likelihood of achieving ecosystem health objectives. The project area is the same as the Proposed Action. The treatments were created based on the Ecological Management scenario that came out of the public workshops for the TNC analysis, but it was modified to conform with the Bishop RMP (USDI BLM 1993a) , primarily by reducing some of the acreages to stay within the treatment limits prescribed in the Fire Management Plan Amendment (USDI BLM 2005a).

The methods are the same as the Proposed Action with the exception of the addition of targeted grazing around Bodie State Historic Park to reduce fuels and to help protect the resources at risk from fire. Grazing would be coordinated with Bodie State Historic Park to ensure that there were no conflicts with management of the park and any grazing on the State Park lands would have to be authorized by the State. Grazing would be carefully controlled with active herding or temporary fencing. Sheep or goats would be used. The grazing prescription would be based on the amount of fuel reduction required and livestock would be removed as soon as the target was achieved. The grazing would not be associated with term grazing permits issued for allotments in the Bodie Hills. The more widespread grazing to reduce cheatgrass that was included in the scenario in the TNC analysis is not included because the TNC analysis did not show an advantage over the use of mechanical methods on a smaller number of acres.

Two other methods included in the TNC analysis were not included: mastication and herbicide use. Mastication is not considered because it did not have any advantages over cutting and piling in a study conducted in the Bodie Hills near Rancheria Gulch. In addition, none of the issues raised in public scoping suggested the use of mastication whereas several raised concerns with the potential use of this method. The amount of fuel left on the ground is a concern for soil impacts in the event of a wildfire and the soil disturbance is greater than hand cutting methods. Herbicide use is not considered because the currently available herbicides effective for the primary species of concern (cheatgrass) are not registered for use in California. The use of other herbicides on less common weeds is too speculative because it is unknown if they will occur. The proposal includes the same early detection monitoring to find new occurrences and the appropriate analysis will be done at that time to treat them.

The method selection criteria and design criteria are the same as the Proposed Action. The major differences from the Proposed Action are summarized below:

- Increase in tree removal from low sagebrush.
- Increase in treatment of montane sagebrush including more prescribed burning, mowing and seeding late successional and depleted stages and removing trees in late successional stages with tree establishment.
- The replacement of mechanical methods to create a fuel break around Bodie State Historic Park with targeted grazing.
- Increase in treatment of late successional stages of Wyoming Sagebrush – loamy using mowing, seeding, and some small prescribed burn treatments.
- Overall increase in acreage to 23,880 acres (a 40% increase over the Proposed Action).

The Increased Acreage Alternative addresses the issues raised in public scoping that the Proposed Action may not be enough to improve the health of the target ecosystems.

The following tables describe the amounts of vegetation to be treated under this alternative. Differences from the Proposed Action are highlighted.

**Tables 3.1-3.9.** Treatment objectives and acreages by ecological system for Alternative 3 (Increased Acreage). Grey shaded text indicates differences from the Proposed Action.

## Upland Treatments

| **3.1 Basin Wildrye – Big Sagebrush** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving ecological condition of Bodie Hills basin wildrye from 73% departure from NRV to 50% departure or less and reducing depleted classes by 50%. Prevent any increase of exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late seral basin wildrye and classes lacking native herbaceous cover to convert them to early development classes (A and B). | Late seral-open (D), Shrub-Annual grass (U ShAG), Annual grass (U Ag)* | 230 | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed fire |
| II. Prevent conversion to pinyon/juniper by treating early tree establishment stages. | Late-open (D), Tree-encroached (U TrEnc), Tree-Annual grass (U TrAG)* | 120 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **350** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives. See adaptive management strategy.

| **3.2 Low Sagebrush** (146% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of maintaining ecological condition of low sagebrush at ~40% departure from NRV or less and limiting increase of high-risk (tree encroached and annual grasses) classes to 10% or less. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Remove trees from later successional stages. | Late-open (E), Mid-open (B), Tree encroached (U TrEnc) | 2,200 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| II. Treat classes with an annual grass component to prevent increase and achieve some conversion to earlier classes. | Annual grass (UAG) , Shrub-Annual grass-Perennial grass (U ShAP) | 800 | -Seeding native species with mowing, hand cutting or spot burning shrubs where necessary for establishment. |
| **Maximum acres of vegetation treatment** | | **3,000** | |

| **3.3 Montane Sagebrush Steppe** (133% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving the ecological condition from high departure (72%) from NRV to moderate departure (~55%) and limiting increase in highest risk classes to 20% or less. Establish a fuel break around Bodie State Historic Park that will also provide ecological benefits by increasing early successional classes. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional, depleted, and annual grass invaded classes to convert them to early development classes with greater native herbaceous cover. | Mid-closed (C) Late-open (D), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 12,300 | -Broadcast prescribed burning<br>-Mowing<br>-Hand cutting small pinyon/juniper**<br>-Seeding native species in the most depleted/high risk sites if necessary |
| II. Remove trees from classes with increasing pinyon/juniper to prevent and reduce conversion. | Late-open (D), Late-closed (E), Tree encroached (U TrEnc), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 1,400 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| III. Reduce fuels around Bodie State Park to protect structures and values at risk by reducing fire risk and increase early development classes. This may include both BLM and State lands. | Several classes – site selection depends on location, not class. | 300*** | Targeted grazing (sheep or goats) using active herding or temporary fencing |
| **Maximum acres of vegetation treatment** | | **14,000** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives.

** Early stages of pinyon/juniper establishment are difficult to map with aerial imagery. Small trees may occur in class C & D. A minimum of 2000 acres of "shrub" treatment in the montane sagebrush system will be removal of conifer trees.

*** Fuel break acres will be periodically maintained to keep fuel loading low.

| **3.4 Mountain Shrub** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Improve the ecological condition from moderate departure (39%) from NRV to low departure (~25%).* | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late developmental classes to return them to early developmental classes. | C (late-closed) and D (Late-open). | 1,000 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **1,000** | |

*The Mountain shrub ecological system was not identified in the report as one of the highest priorities for treatment so the objectives for managing this system were not explored in detail. The Bishop Field Office chose to add this system and create management objectives for it because it has a high probability of success and can be included with adjacent ecosystems in prescribed burns.

| **3.5 Wyoming big sagebrush – loamy** (400% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving ecological condition from highly departed (~74%) to moderately departed (<66%) and reducing the risk of wildfire spreading to adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late development classes with some treatments designed as fuel break arranged along roads to return them to early development classes and reduce the fuel load and continuity. | Late-closed (C), Late2-open (D), Late2-closed (E), Depleted (U DPL) , other classes as necessary to complete fuel break. | 2,800 | -Mowing<br>-Seeding native species<br>-Small spring prescribed burns to test control of cheatgrass |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 600* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **3,400** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because tree establishment in this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 600 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

| **3.6 Wyoming big sagebrush – sandy** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goal of improving ecological condition by a small percentage (5%) while reducing risk of wildfire spreading into adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Create fuel breaks mostly arranged along roads to convert to early developmental classes and reduce fuel load and continuity. | Many; site selection depends on location rather than class but majority of area will be in Depleted (U DPL), Late-closed (C), Late2-open (D), Late2-closed (E). | 500** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Seeding native species if necessary |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 1,000* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **1,500** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because tree establishment in this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 5670 acres with pinyon/juniper established by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

## Associated Riparian Treatments

| **3.7 Montane riparian** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the riparian habitat at less than ~33% departure from the natural range of variability. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages and reverse or prevent conversion to upland woody species. | Late-closed (E), Shrub-Forb-Encroached (U SFEnc) | 30 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **30** | |

| **3.8 Stable aspen** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of improving the ecological condition from 41% departure from the natural range of variability to ~33% departure and reduce "no aspen" classes by ~50%. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages, reverse or prevent conversion to upland species, and promote healthy aspen regeneration. | Late1-closed (E), Late1-open (D), Depleted-open (U DPL), No aspen (U NAS) | 500 | -Broadcast prescribed burning<br>-Hand cutting pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **500** | |

| **3.9 Wet meadows** (no change from the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the ecological condition of wet meadow at less than 33% departure from the natural range of variability and preventing any increase in exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat areas of iris or sagebrush to convert them to early seral classes. | Shrub-Forb encroached (U SFEnc), Desertification (U DES), Tree encroached (U TrEnc) | 100 | -Broadcast prescribed burning<br>-Mowing |
| **Maximum acres of vegetation treatment** | | **100** | |

* Other methods were recommended in the report in addition to broadcast burning. Those methods are outside the scope of this analysis because they are not among the tools also being used in the uplands.

## Sum of All Ecological Systems:

| | |
|---|---|
| **Total maximum acres of vegetation treatment across all ecological systems*** | **23,880** (135 % of the Proposed Action) |

* Does not include maintenance of established fuel breaks or weed treatments.

## Alternative 4: Treatment within CWPP WUI area only

The Mono County Community Wildfire Protection Plan Wildland Urban Interface (CWPP WUI) Alternative restricts the area for treatments to within the CWPP designated Wildland Urban Interface (Mono County 2009) only (see Figure 4 below). The project area and treatments are reduced to 61% of the amounts in the Proposed Action. The treatment amounts are scaled according to the proportion of the ecosystem type that occurs within the CWPP WUI area and are shown in detailed tables below. All differences from the Proposed Action are highlighted.

The methods, method selection criteria, and design criteria are the same as the Proposed Action.

The CWPP WUI Alternative was developed to respond to issues raised by the public about the magnitude of the treatment and project areas and the suggestion that the objectives could possibly be accomplished by limiting the treatments to areas that would help prevent wildfire threats to structures and communities. The CWPP WUI was designated by considering the area where fire could reach structures within one day. Another alternative with even more restricted treatments just within the immediate vicinity of structures was also considered but eliminated from detailed analysis (Alternative 6: Fuel Breaks Alternative was found to not meet the purpose and need for action).

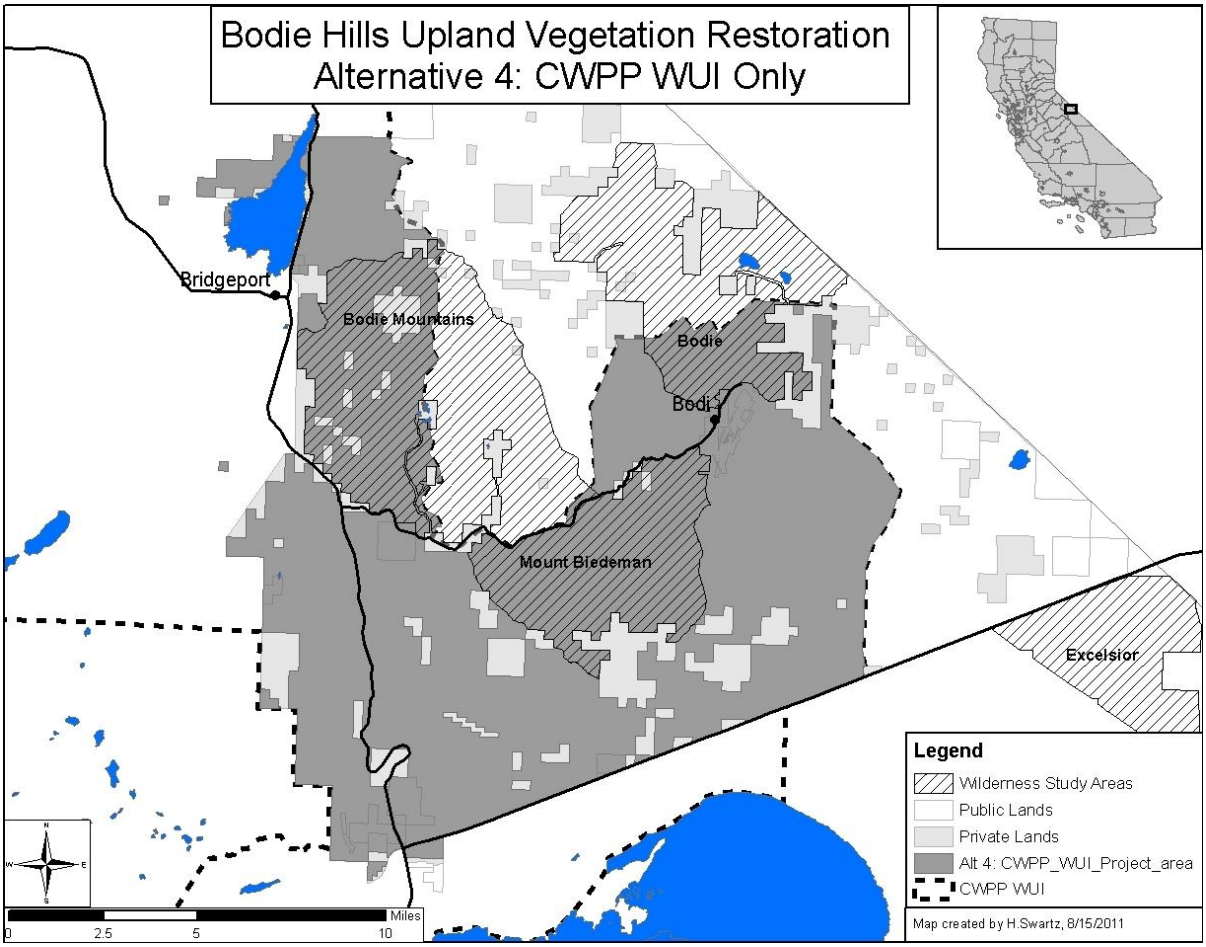



**Figure 4.** Map of the modified project area for Alternative 4 (CWPP WUI Only). Under this alternative, the treatments would be restricted to the area in the Bodie Hills within the Wildland Urban Interface (WUI) as designated in the Mono County Community Wildfire Protection Plan.

**Tables 4.1-4.9.** Treatment objectives and acreages by ecological system for Alternative 4 (CWPP WUI Only). Grey shaded text indicates differences from the Proposed Action.

## Upland Treatments

| **4.1 Basin Wildrye – Big Sagebrush** (68% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving ecological condition of Bodie Hills basin wildrye from 73% departure from NRV to 50% departure or less and reducing depleted classes by 50%. Prevent any increase of exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late seral basin wildrye and classes lacking native herbaceous cover to convert them to early development classes (A and B). | Late seral-open (D), Shrub-Annual grass (U ShAG), Annual grass (U Ag)* | 160 | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed fire |
| II. Prevent conversion to pinyon/juniper by treating early tree establishment stages. | Late-open (D), Tree-encroached (U TrEnc), Tree-Annual grass (U TrAG)* | 80 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **240** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives. See adaptive management strategy.

| **4.2 Low Sagebrush** (37% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of maintaining ecological condition of low sagebrush at ~40% departure from NRV or less and limiting increase of high-risk (tree encroached and annual grasses) classes to 10% or less. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Remove trees from later successional stages. | Late-open (E), Mid-open (B), Tree encroached (U TrEnc) | 460 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| II. Treat classes with an annual grass component to prevent increase.* | Annual grass (UAG) , Shrub-Annual grass-Perennial grass (U ShAP) | 290 | -Seeding native species with mowing, hand cutting or spot burning shrubs where necessary for establishment |
| **Maximum acres of vegetation treatment** | | **750** | |

*Strategy II was added to the scenario analyzed in the Provencher, Low et al. 2009 report because California BLM does not have the option of using effective herbicides on annual grasses and this is the most effective strategy to minimize annual grasses without the use of chemicals. The area to be treated over 10 years was derived from the acres of annual grass mapped in the

analysis. Treatment of those acres should limit the increase of annual grasses, however, the amount in the U ShAP class was likely underestimated because the current sites are small and hard to detect with remote sensing.

| **4.3 Montane Sagebrush Steppe** (60% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving the ecological condition from high departure (72%) from NRV to moderate departure (~55%) and limiting increase in highest risk classes to 20% or less. Establish a fuel break around Bodie State park that will also provide ecological benefits by increasing early successional classes. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional, depleted, and annual grass invaded classes to convert them to early development classes with greater native herbaceous cover. | Mid-closed (C) Late-open (D), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 5620 | -Broadcast prescribed burning<br>-Mowing<br>-Hand cutting small pinyon/juniper**<br>-Seeding native species in the most depleted/high risk sites if necessary |
| II. Remove trees from classes with increasing pinyon/juniper to prevent and reduce conversion. | Late-open (D), Late-closed (E), Tree encroached (U TrEnc), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP), Shrub-Annual grass (U ShAG) | 450 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| III. Construct and maintain a 300 ft. fuel break around structures and values at risk (ex. Bodie State Park) to reduce fire risk and increase early development classes. This may include both BLM and State lands. | Several classes – site selection depends on location, not class. | 300*** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed burning<br>-Seeding native species if necessary |
| **Maximum acres of vegetation treatment** | | **6370** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives.
**Early stages of pinyon/juniper establishment are difficult to map with aerial photography. Small trees may occur in class C and D.
*** Fuel break acres will be periodically maintained to keep fuel loading low.

| **4.4 Mountain Shrub** (85% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Improve the ecological condition from moderate departure (39%) from NRV to low departure (~25%).* | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late developmental classes to return them to early developmental classes. | C (late-closed) and D (Late-open). | 850 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **850** | |

*The Mountain shrub ecological system was not identified in the report as one of the highest priorities for treatment so the objectives for managing this system were not explored in detail. The Bishop Field Office chose to add this system and create management objectives for it because it has a high probability of success and can be included with adjacent ecosystems in prescribed burns.

| **4.5 Wyoming big sagebrush – loamy** (100% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving ecological condition from highly departed (~74%) to moderately departed (<66%) and reducing the risk of wildfire spreading to adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late development classes in fuel breaks mostly arranged along roads to return them to early development classes and reduce the fuel load and continuity. | Late-closed (C), Late2-open (D), Late2-closed (E), Depleted (U DPL) , other classes as necessary to complete fuel break. | 250** | -Mowing<br>-Seeding native species |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 600* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **850** | |

*Pinyon/juniper removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 600 acres of tree establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

| **4.6 Wyoming big sagebrush – sandy** (59% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goal of improving ecological condition by a small percentage (5%) while reducing risk of wildfire spreading into adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Create fuel breaks mostly arranged along roads to convert to early developmental classes and reduce fuel load and continuity. | Many; site selection depends on location rather than class but majority of area will be in Depleted (U DPL), Late-closed (C), Late2-open (D), Late2-closed (E). | 295** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Seeding native species if necessary |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 590* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **885** | |

*Pinyon/juniper removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because tree establishment in this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 5670 acres of pinyon/juniper established by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

## Associated Riparian Treatments

| **4.7 Montane riparian** (91% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the riparian habitat at less than ~33% departure from the natural range of variability. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages and reverse or prevent conversion to upland woody species. | Late-closed (E), Shrub-Forb-Encroached (U SFEnc) | 27 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **27** | |

| **4.8 Stable aspen** (46% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of improving the ecological condition from 41% departure from the natural range of variability to ~33% departure and reduce "no aspen" classes by ~50%. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages, reverse or prevent conversion to upland species, and promote healthy aspen regeneration. | Late1-closed (E), Late1-open (D), Depleted-open (U DPL), No aspen (U NAS) | 230 | -Broadcast prescribed burning<br>-Hand cutting pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **230** | |

| **4.9 Wet meadows** (66% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the ecological condition of wet meadow at less than 33% departure from the natural range of variability and preventing any increase in exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat areas of iris or sagebrush to convert them to early seral classes. | Shrub-Forb encroached (U SFEnc), Desertification (U DES), Tree encroached (U TrEnc) | 66 | -Broadcast prescribed burning* |
| **Maximum acres of vegetation treatment** | | **66** | |

* Other methods were recommended in the report in addition to broadcast burning. Those methods are outside the scope of this analysis because they are not among the tools also being used in the uplands.

## Sum of All Ecological Systems:

| | |
|---|---|
| **Total maximum acres of vegetation treatment across all ecological systems*** | **10268** (61% of Proposed Action) |

* Does not include maintenance of established fuel breaks or weed treatments.

## Alternative 5: Limited Treatment in WSAs

This alternative is similar to the Proposed Action, but broadcast burning or spot burning would be the only treatment method that would be used in WSAs. Outside the WSAs, the methods and treatments would be identical to the Proposed Action. The project area would remain the same (see map for Proposed Action).

The amount of treatment in the WSAs is reduced from the Proposed Action because broadcast burning and spot burning are not always the appropriate treatment methods depending on the ecosystem type and the site characteristics. For example, with our current techniques, broadcast burning cannot be used where there is already cheatgrass in the understory because of the risk of increasing the cheatgrass cover. Broadcast burning is also not desirable in vegetation classes that have good sagebrush cover near sage-grouse leks because of the impacts to sage-grouse nesting habitat. Spot burning could be used in priority sage-grouse habitat if it will meet the desired conditions. Near structures prescribed burning can be too risky without mechanical treatment. There are portions of the WSAs that are near communities and structures such as Bodie State Historic Park. Therefore the treatments are scaled from the Proposed Action amounts as shown in the tables below according to the available acres of the target ecosystem type and class that occur inside WSAs. This means that the treatment amounts for specific ecosystem types range from as little as 53% of the Proposed Action to as much as 100% of the Proposed Action. Overall the total treatment acreage is only 76% of the acreage in the Proposed Action (12,903 acres).

The method selection criteria remain the same as the Proposed Action except in the WSAs where broadcast and spot burning would be the only available methods. The design criteria also remain the same as the Proposed Action except that instead of being the preferred methods, broadcast and spot burning become the only methods to be used in the WSAs.

Alternative 5 was developed to respond to issues raised about potential impacts to WSAs, especially treatments that were considered high impact (mechanical treatments).

The treatment amounts and methods for each ecosystem type are shown in the tables below. Differences from the Proposed Action are highlighted.

**Tables 5.1-5.9.** Treatment objectives and acreages by ecological system for Alternative 5 (Limited Treatment in WSAs). Grey shaded text indicates differences from the Proposed Action.

## Upland Treatments

| **5.1 Basin Wildrye – Big Sagebrush** (90% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving ecological condition of Bodie Hills basin wildrye from 73% departure from NRV to 50% departure or less and reducing depleted classes by 50%. Prevent any increase of exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late seral basin wildrye and classes lacking native herbaceous cover to convert them to early development classes (A and B). | Late seral-open (D), Shrub-Annual grass (U ShAG), Annual grass (U Ag)* | 210 | -Mowing (outside WSAs only)<br>-Hand cutting shrubs with piling and burning or chipping (outside WSAs only)<br>-Broadcast prescribed fire |
| II. Prevent conversion to pinyon/juniper by treating early establishment stages. | Late-open (D), Tree-encroached (U TrEnc), Tree-Annual grass (U TrAG)* | 105 | -Hand cutting pinyon/juniper with piling and burning or chipping (outside WSAs only)<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **315** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives. See adaptive management strategy.

| **5.2 Low Sagebrush** (53% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of maintaining ecological condition of low sagebrush at ~40% departure from NRV or less and limiting increase of high-risk (tree encroached and annual grasses) classes to 10% or less. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Remove trees from later successional stages. | Late-open (E), Mid-open (B), Tree encroached (U TrEnc) | 665 | -Hand cutting pinyon/juniper with piling and burning or chipping (outside WSAs only)<br>-Spot burning pinyon/juniper |
| II. Treat classes with an annual grass component to prevent increase.* | Annual grass (UAG) , Shrub-Annual grass-Perennial grass (U ShAP) | 425 | -Seeding native species with mowing, hand cutting or spot burning shrubs where necessary for establishment (outside WSAs only) |
| **Maximum acres of vegetation treatment** | | **1090** | |

*Strategy II was added to the scenario analyzed in the Provencher, Low et al. 2009 report because California BLM does not have the option of using effective herbicides on annual grasses and this is the most effective strategy to minimize annual grasses without the use of chemicals. The area to be treated over 10 years was derived from the acres of annual grass mapped in the analysis. Treatment of those acres should limit the increase of annual grasses, however, the amount in the U ShAP class was likely underestimated because the current sites are small and hard to detect with remote sensing.

| **5.3 Montane Sagebrush Steppe** (73% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving the ecological condition from high departure (72%) from NRV to moderate departure (~55%) and limiting increase in highest risk classes to 20% or less. Establish a fuel break around Bodie State park that will also provide ecological benefits by increasing early successional classes. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional, depleted, and annual grass invaded classes to convert them to early development classes with greater native herbaceous cover. | Mid-closed (C) Late-open (D), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 6930 | -Broadcast prescribed burning<br>-Mowing (outside WSAs only)<br>-Hand cutting small pinyon/juniper** (outside WSAs only)<br>-Seeding native species in the most depleted/high risk sites if necessary |
| II. Remove trees from classes with increasing pinyon/juniper to prevent and reduce conversion. | Late-open (D), Late-closed (E), Tree encroached (U TrEnc), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP), Shrub-Annual grass (U ShAG) | 550 | -Hand cutting pinyon/juniper with piling and burning or chipping (outside WSAs only)<br>-Spot burning pinyon/juniper |
| III. Construct and maintain a 300 ft. fuel break around structures and values at risk (ex. Bodie State Park) to reduce fire risk and increase early development classes. This may include both BLM and State lands. | Several classes – site selection depends on location, not class. | 200*** | -Mowing (outside WSAs only)<br>-Hand cutting shrubs with piling and burning or chipping (outside WSAs only)<br>-Broadcast prescribed burning<br>-Seeding native species if necessary |
| **Maximum acres of vegetation treatment** | | **7680** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives.
**Early stages of pinyon/juniper establishment are difficult to map with aerial photography. Small trees may occur in class C and D.
*** Fuel break acres will be periodically maintained to keep fuel loading low. The acres are reduced from the Proposed Action because the Bodie WSA follows the boundary of the Park on one side. The fuel break will not be complete in this alternative because of the proximity of the WSA.

| **5.4 Mountain Shrub** (100% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Improve the ecological condition from moderate departure (39%) from NRV to low departure (~25%).* | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late developmental classes to return them to early developmental classes. | C (late-closed) and D (Late-open). | 1000 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **1000** | |

*The Mountain shrub ecological system was not identified in the report as one of the highest priorities for treatment so the objectives for managing this system were not explored in detail. The Bishop Field Office chose to add this system and create management objectives for it because it has a high probability of success and can be included with adjacent ecosystems in prescribed burns.

| **5.5 Wyoming big sagebrush – loamy** (96% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving ecological condition from highly departed (~74%) to moderately departed (<66%) and reducing the risk of wildfire spreading to adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late development classes in fuel breaks mostly arranged along roads to return them to early development classes and reduce the fuel load and continuity. | Late-closed (C), Late2-open (D), Late2-closed (E), Depleted (U DPL), other classes as necessary to complete fuel break. | 240** | -Mowing<br>-Seeding native species if necessary (All outside WSAs) |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 575* | -Hand cutting pinyon/juniper with piling and burning or chipping (outside of WSAs)<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **815** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 600 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

| **5.6 Wyoming big sagebrush – sandy** (100% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goal of improving ecological condition by a small percentage (5%) while reducing risk of wildfire spreading into adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Create fuel breaks mostly arranged along roads to convert to early developmental classes and reduce fuel load and continuity. | Many; site selection depends on location rather than class but majority of area will be in Depleted (U DPL), Late-closed (C), Late2-open (D), Late2-closed (E). | 500** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Seeding native species if necessary (all outside of WSAs) |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 1000* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **1500** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 5670 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

## Associated Riparian Treatments

| **5.7 Montane riparian** (93% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the riparian habitat at less than ~33% departure from the natural range of variability. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages and reverse or prevent conversion to upland woody species. | Late-closed (E), Shrub-Forb-Encroached (U SFEnc) | 28 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **28** | |

| **5.8 Stable aspen** (75% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of improving the ecological condition from 41% departure from the natural range of variability to ~33% departure and reduce "no aspen" classes by ~50%. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages, reverse or prevent conversion to upland species, and promote healthy aspen regeneration. | Late1-closed (E), Late1-open (D), Depleted-open (U DPL), No aspen (U NAS) | 375 | -Broadcast prescribed burning<br>-Hand cutting pinyon/juniper (only outside WSAs) |
| **Maximum acres of vegetation treatment** | | **375** | |

| **5.9 Wet meadows** (100% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the ecological condition of wet meadow at less than 33% departure from the natural range of variability and preventing any increase in exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat areas of iris or sagebrush to convert them to early seral classes. | Shrub-Forb encroached (U SFEnc), Desertification (U DES), Tree encroached (U TrEnc) | 100 | -Broadcast prescribed burning* |
| **Maximum acres of vegetation treatment** | | **100** | |

* Other methods were recommended in the report in addition to broadcast burning. Those methods are outside the scope of this analysis because they are not among the tools also being used in the uplands.

## Sum of All Ecological Systems:

| | |
|---|---|
| **Total maximum acres of vegetation treatment across all ecological systems*** | **12903** (76% of the Proposed Action) |

* Does not include maintenance of established fuel breaks or weed treatments.

## Alternative 6: No Treatment in WSAs

This alternative is similar to the Proposed Action, but the project area is reduced by excluding the WSAs resulting in a total area of 112,294 acres of BLM lands (67% of the acreage in the Proposed Action) (See Figure 5). The treatments are scaled according to the proportion of the target ecosystem type and class that occurs outside of the WSAs as shown in the table for each ecosystem type below. This means that the treatment amounts for specific ecosystem types range from as little as 51% of the Proposed Action to as much as 100% of the Proposed Action and overall the treatment acreage is only 67% of the acreage in the Proposed Action (11,288 acres).

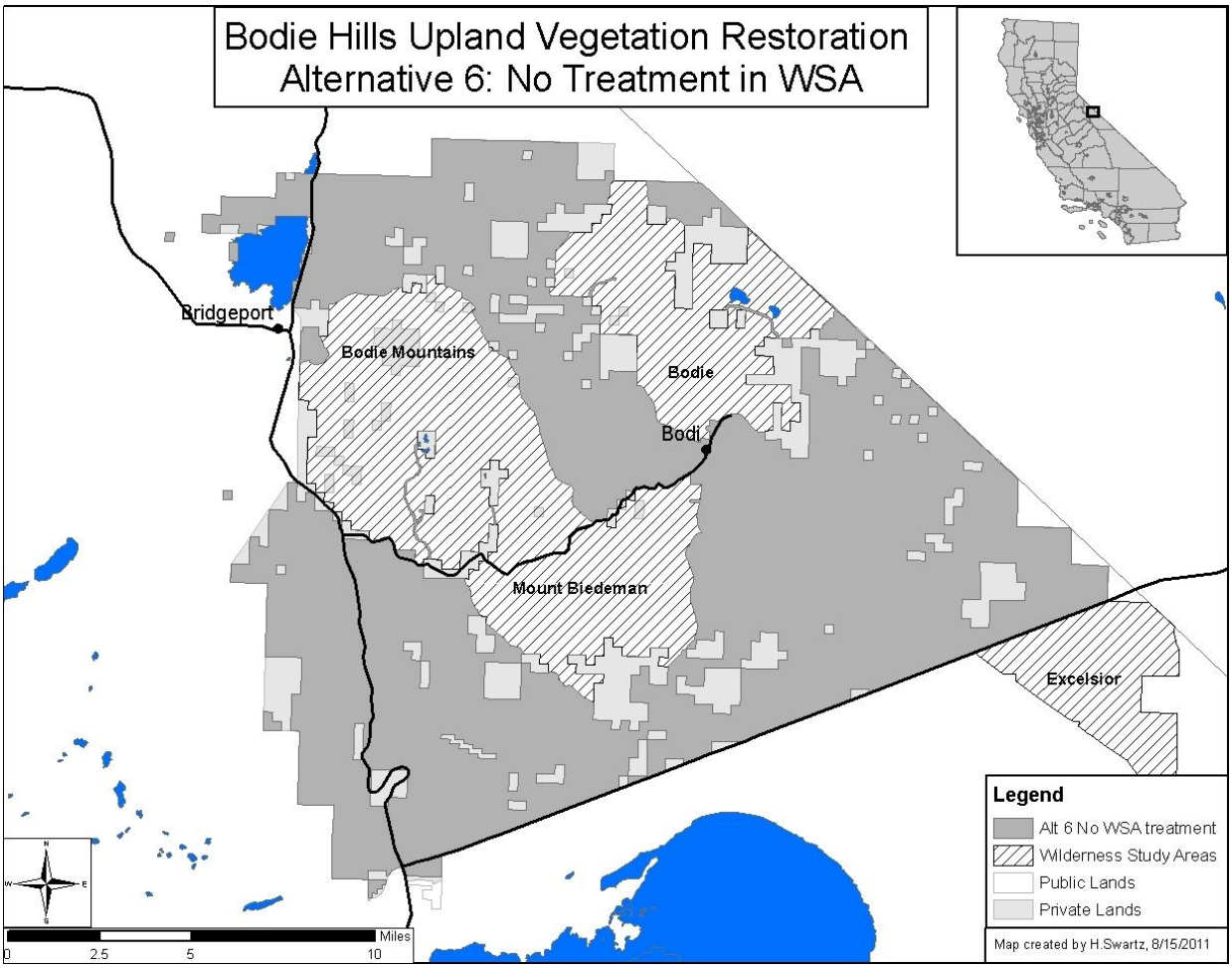



**Figure 5.** Map of Alternative 6 (No treatment in WSAs). Under this alternative, treatments would be restricted to the area in the Bodie Hills outside of the WSAs.

The method selection criteria remain the same as the Proposed Action. The design criteria also remain the same as the Proposed Action.

Alternative 6 was developed to respond to issues raised about potential impacts to WSAs and to provide a comparative analysis between treatments across the whole landscape and just outside these WSAs. This allows the Bishop Field Manager to evaluate whether treatment in WSAs is necessary for ecological restoration and maintenance or improvement of their wilderness characteristics as required by BLM policy. “A reasonable range of alternatives, including alternative approaches to accomplishing the same management objectives, must be analyzed in

the NEPA document, including alternative sites both inside and outside the WSA" (BLM Manual 6300 1.6.E.3.f.ii).

The treatment amounts and methods for each ecosystem type are shown in the tables below. Differences from the Proposed Action are highlighted.

**Table 6.1-6.9.** Treatment objectives and acreages by ecological system for Alternative 6 (No Treatment in WSAs). Grey shaded text indicates differences from the Proposed Action.

## Upland Treatments

| **6.1 Basin Wildrye – Big Sagebrush** (87% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving ecological condition of Bodie Hills basin wildrye from 73% departure from NRV to 50% departure or less and reducing depleted classes by 50%. Prevent any increase of exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late seral basin wildrye and classes lacking native herbaceous cover to convert them to early development classes (A and B). | Late seral-open (D), Shrub-Annual grass (U ShAG), Annual grass (U Ag)* | 200 | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed fire |
| II. Prevent conversion to pinyon/juniper by treating early establishment stages. | Late-open (D), Tree-encroached (U TrEnc), Tree-Annual grass (U TrAG)* | 105 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **305** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives. See adaptive management strategy.

| **6.2 Low Sagebrush** (51% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of maintaining ecological condition of low sagebrush at ~40% departure from NRV or less and limiting increase of high-risk (tree encroached and annual grasses) classes to 10% or less. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Remove trees from later successional stages. | Late-open (E), Mid-open (B), Tree encroached (U TrEnc) | 640 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| II. Treat classes with an annual grass component to prevent increase.* | Annual grass (UAG) , Shrub-Annual grass-Perennial grass (U ShAP) | 400 | -Seeding native species with mowing, hand cutting or spot burning shrubs where necessary for establishment |
| **Maximum acres of vegetation treatment** | | **1040** | |

*Strategy II was added to the scenario analyzed in the Provencher, Low et al. 2009 report because California BLM does not have the option of using effective herbicides on annual grasses and this is the most effective strategy to minimize annual grasses without the use of chemicals. The area to be treated over 10 years was derived from the acres of annual grass mapped in the analysis. Treatment of those acres should limit the increase of annual grasses, however, the amount in the U ShAP class was likely underestimated because the current sites are small and hard to detect with remote sensing.

| **6.3 Montane Sagebrush Steppe** (60% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:**<br>Work towards the long term (20 year) goals of improving the ecological condition from high departure (72%) from NRV to moderate departure (~55%) and limiting increase in highest risk classes to 20% or less. Establish a fuel break around Bodie State park that will also provide ecological benefits by increasing early successional classes. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional, depleted, and annual grass invaded classes to convert them to early development classes with greater native herbaceous cover. | Mid-closed (C) Late-open (D), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP)*, Shrub-Annual grass (U ShAG)* | 5680 | -Broadcast prescribed burning<br>-Mowing<br>-Hand cutting small pinyon/juniper**<br>-Seeding native species in the most depleted/high risk sites if necessary |
| II. Remove trees from classes with increasing pinyon/juniper to prevent and reduce conversion. | Late-open (D), Late-closed (E), Tree encroached (U TrEnc), Depleted (U DPL), Shrub-Annual grass-Perennial grass (U ShAP), Shrub-Annual grass (U ShAG) | 450 | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| III. Construct and maintain a 300 ft. fuel break around structures and values at risk (ex. Bodie State Park) to reduce fire risk and increase early development classes. This may include both BLM and State lands. | Several classes – site selection depends on location, not class. | 200*** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Broadcast prescribed burning<br>-Seeding native species if necessary |
| **Maximum acres of vegetation treatment** | | **6330** | |

* Classes with large annual grass components will only be treated if trials of methods such as spring burning are shown to be successful at restoring a greater percentage of natives.
**Early stages of pinyon/juniper establishment are difficult to map with aerial photography. Small trees may occur in class C and D.
*** Fuel break acres will be periodically maintained to keep fuel loading low. The acres are reduced from the Proposed Action because the Bodie WSA follows the boundary of the Park on one side. The fuel break will not be complete in this alternative because of the proximity of the WSA.

| **6.4 Mountain Shrub** (93% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Improve the ecological condition from moderate departure (39%) from NRV to low departure (~25%).* | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late developmental classes to return them to early developmental classes. | C (late-closed) and D (Late-open). | 930 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **930** | |

*The Mountain shrub ecological system was not identified in the report as one of the highest priorities for treatment so the objectives for managing this system were not explored in detail. The Bishop Field Office chose to add this system and create management objectives for it because it has a high probability of success and can be included with adjacent ecosystems in prescribed burns.

| **6.5 Wyoming big sagebrush – loamy** (96% of Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goals of improving ecological condition from highly departed (~74%) to moderately departed (<66%) and reducing the risk of wildfire spreading to adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late development classes in fuel breaks mostly arranged along roads to return them to early development classes and reduce the fuel load and continuity. | Late-closed (C), Late2-open (D), Late2-closed (E), Depleted (U DPL), other classes as necessary to complete fuel break. | 240** | -Mowing<br>-Seeding native species if necessary |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 575* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **815** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al.2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 600 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

| **6.6 Wyoming big sagebrush – sandy** (100% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Work towards the long term (20 year) goal of improving ecological condition by a small percentage (5%) while reducing risk of wildfire spreading into adjoining ecosystems and properties or structures. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Create fuel breaks mostly arranged along roads to convert to early developmental classes and reduce fuel load and continuity. | Many; site selection depends on location rather than class but majority of area will be in Depleted (U DPL), Late-closed (C), Late2-open (D), Late2-closed (E). | 500** | -Mowing<br>-Hand cutting shrubs with piling and burning or chipping<br>-Seeding native species if necessary |
| II. Remove trees from classes with increasing pinyon/juniper.* | Late-closed (C), Late2-open (D), Late2-closed (E), Tree encroached 9U TrEnc) | 1000* | -Hand cutting pinyon/juniper with piling and burning or chipping<br>-Spot burning pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **1500** | |

*Tree removal was not included in the management scenario for this ecological system in the Provencher, Low et al. 2009 report, but it was included in this Proposed Action because pinyon/juniper establishment into this system was under represented in the mapping based on field review. In addition, the analysis also predicts that there would be 5670 acres of pinyon/juniper establishment by the end of the scenario without active management. No true juniper or pinyon woodlands will be treated.
** Fuel break acres will be periodically maintained to keep fuel loading low.

## Associated Riparian Treatments

| **6.7 Montane riparian** (87% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the riparian habitat at less than ~33% departure from the natural range of variability. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages and reverse or prevent conversion to upland woody species. | Late-closed (E), Shrub-Forb-Encroached (U SFEnc) | 26 | -Broadcast prescribed burning |
| **Maximum acres of vegetation treatment** | | **26** | |

| **6.8 Stable aspen** (54% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of improving the ecological condition from 41% departure from the natural range of variability to ~33% departure and reduce "no aspen" classes by ~50%. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat late successional classes to move them to early successional stages, reverse or prevent conversion to upland species, and promote healthy aspen regeneration. | Late1-closed (E), Late1-open (D), Depleted-open (U DPL), No aspen (U NAS) | 270 | -Broadcast prescribed burning<br>-Hand cutting pinyon/juniper |
| **Maximum acres of vegetation treatment** | | **270** | |

| **6.9 Wet meadows** (72% of the Proposed Action) | | | |
|---|---|---|---|
| **Objective:** Contribute to the long term (20 year) goal of maintaining the ecological condition of wet meadow at less than 33% departure from the natural range of variability and preventing any increase in exotic forbs. | | | |
| **Strategy** | **Classes to be treated (See Appendix B for class descriptions)** | **Acres over 10 years** | **Management tools to be used** |
| I. Treat areas of iris or sagebrush to convert them to early seral classes. | Shrub-Forb encroached (U SFEnc), Desertification (U DES), Tree encroached (U TrEnc) | 72 | -Broadcast prescribed burning* |
| **Maximum acres of vegetation treatment** | | **72** | |

* Other methods were recommended in the report in addition to broadcast burning. Those methods are outside the scope of this analysis because they are not among the tools also being used in the uplands.

## Sum of All Ecological Systems:

| | |
|---|---|
| **Total maximum acres of vegetation treatment across all ecological systems*** | **11288** (67% of the Proposed Action) |

* Does not include maintenance of established fuel breaks or weed treatments.

# CHAPTER 3: ENVIRONMENTAL EFFECTS

## Summary of Environmental Effects

The following summary describes the overall effects for the broad resource categories analyzed in this EA. The overall effect is the net effect over a timeframe of 10-20 years. Detailed analyses follow in the Analysis of Issues and Analysis Required by Other Authorities. The symbols used in the tables are intended to show the relative differences between the Alternatives and the absolute values are somewhat subjective. The reader should depend on the text to understand the nature of the effects.

**Tables 7.10-7.15.** Quick visual summary of net effects to the broad resource categories analyzed in the EA with brief summary conculsions for each alternative.

Key to Symbols:
↑ Minor improvement or beneficial effect
↑↑ Larger improvement or beneficial effect
↔ No change or positive and negative effects are balanced against each other
↓ Minor decline or negative effect
↓↓ Larger decline or negative effect
↑↑↓↔ Mixed symbols indicates mixed effects for different components of the resource

### Ecological Departure

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↔↓↑ | ↑↑↔ | ↑↑↑↔ | ↑↓↔ | ↑↓↔ | ↑↓↔ |

The predicted effects to Ecological Departure and related measures are complex because the amount of treatment is constrained and effects are measured at a landscape scale for multiple ecological systems. Outcomes are predicted to be mixed, but the comparison between alternatives show a clear pattern. See also the implications for other resources which follow.

**Alternative 1** would result in increases in Ecological Departure for a few ecological systems, maintenance of a high level of Ecological Departure in most ecological systems and minor decreases in other ecological systems if the amount of wildfire increases despite fire suppression. High risk vegetation classes would increase dramatically in 3 ecological systems, remain the same in some and depending on wildfire, may decrease in 3 ecological systems. No key underrepresented seral classes would be created except by natural disturbance.

**Alternative 2** would reduce the Ecological Departure compared to No Action in 5 of the 9 ecological systems, a beneficial effect for the Bodie Hills at a landscape scale. The amount of high risk vegetation classes would be reduced compared to No Action in 8 out of 9 of the ecological systems, a beneficial effect for the Bodie Hills landscape and the potential for its native ecological systems to be converted to uncharacteristic and non-native states. The Proposed Action would double the amount of underrepresented early seral classes in shrublands and would create almost 4,000 acres of open sagebrush habitat critical for sagebrush obligate wildlife and for maintaining a natural fire regime.

**Alternative 3** would have further benefits compared to the Proposed Action for Ecological Departure, high risk vegetation classes, and underrepresented key seral classes especially in three important ecological systems, low sagebrush, montane sagebrush, and Wyoming sagebrush – loamy.

**Alternatives 4-6** would be less effective than the Proposed Action at reducing Ecological Departure and high risk vegetation classes and creating underrepresented key seral classes. The amount of benefit would vary by ecological system because of their uneven distributions across the landscape. Overall, of the reduced acreage alternatives, the most effective would be Alternative 5 and the least effective would be Alternative 6.

## Fragmentation

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓↓ | ↔ | ↑↔ | ↓ | ↓ | ↓ |

**Alternative 1** would result in greater fragmentation of the ecological systems and habitats in the Bodie Hills due to the potential for severe wildfire outside the range of natural variability and conversion to non-native annual grasses. This would be a net negative impact on the Bodie Hills.

**Alternative 2** would reduce the risk of fragmentation in the Bodie Hills compared to No Action potentially maintaining the current conditions.

**Alternative 3** would have an increased likelihood of success in preventing fragmentation compared to the Proposed Action.

**Alternatives 4-6** would be less likely to mitigate the risk of fragmentation in the Bodie Hills compared to the Proposed Action because the amount of treatment would not reach the threshold necessary to affect disturbance regimes at a landscape scale.

## Fire Regime

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓↓ | ↔ | ↑ | ↓ | ↓ | ↓ |

**Alternative 1** would result in the potential for larger, more frequent and more severe wildfire outside the range of natural variability due to the fuel loading resulting from the continuous late seral vegetation classes and the expansion of pinyon and juniper. Fire suppression would continue, but would not be likely to be able to contain the increase in fire. This effect has already been observed in neighboring landscapes. This would be a net negative impact on the Bodie Hills (see the effects to other resources).

**Alternative 2** would reduce the risk of fire outside the natural range of variability compared to No Action by introducing more patches of early seral vegetation.

**Alternative 3** would have an increased likelihood of success in maintaining a natural fire regime compared to the Proposed Action because of the increased treatment levels.

**Alternatives 4-6** would be less likely to mitigate the risk of fire outside the natural range of variability compared to the Proposed Action because the amount of treatment would not reach the threshold necessary to affect the fire regimes at a landscape scale as documented in other landscapes.

## Vegetation

**Sensitive plants**

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓↓ | ↑ | ↑↑ | ↓ | ↓ | ↓ |

**Alternative 1** could result in declines in Sensitive plants due to further expansion of pinyon and juniper into their habitat, invasion by cheatgrass, and increased severe wildfire.

**Alternative 2** would reduce the risk of negative impacts to Sensitive plant populations and help maintain them in their current condition by removing expanding pinyon and juniper and reducing the risk of conversion to cheatgrass after severe wildfire. Any short term minor effects due to treatments would be outweighed by the longer term benefits.

**Alternative 3** would be more likely to result long term benefit Sensitive plant species and their habitat than the Proposed Action.

**Alternatives 4-6** would be more beneficial to Sensitive plants than the No Action Alternative. However, it is still more likely that Sensitive plant occurrences would be adversely affected by direct loss of habitat caused by encroaching vegetation or the effects associated with higher intensity wildfires compared to the Proposed Action. The greatest adverse impacts would be to species that occur in the low sagebrush ecological system especially in Alternative 4 where treatments would be only 37% of the amount in the Proposed Action.

**Invasive Species**

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓↓ | ↔↓ | ↔↓ | ↓ | ↓ | ↓ |

**Alternative 1** would result in increased risk of experiencing high intensity wildfires that would likely lead to significant increases in cheatgrass abundance and distribution.

**Alternative 2** would be beneficial compared to No Action. Beneficial effects are expected to outweigh potential adverse effects of the treatments in the long term by reducing the potential increase of invasive plants associated with wildfires that may occur with No Action. Overall improvement in the amount of invasive species would not be expected without methods being available to eradicate the current non-native populations, but the treatments may help prevent or reduce increases.

**Alternative 3** would be very similar to the Proposed Action if not more beneficial in terms of reducing the potential for Invasive plant abundance and spread.

**Alternatives 4-6** would have a greater risk of future increase of invasive plant distribution and abundance when compared to the Proposed Action and Increased Acreage alternative and less risk than No Action.

## Wildlife

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↑↑ | ↑↑↑ | ↑ | ↑ | ↑ |

**Alternative 1** may have negative impacts on greater sage-grouse due to degradation of habitat by further pinyon-juniper expansion and conversion of habitat to cheatgrass after severe wildfires. Sage-grouse would continue to be limited by the lack of early seral stages in sagebrush ecological types. Similar effects are expected for other wildlife species including pygmy rabbits and mule deer.

**Alternative 2** is expected to benefit sage-grouse, pygmy rabbits, mule deer and other wildlife species through improved habitat diversity and reduced wildfire risk. Any short term impacts of treatments would be outweighed by the longer term benefits to habitat. Wildlife species that use pinyon woodlands would not be affected because of the small percentage of the total pinyon cover that will be treated and the focus on young trees and early stages of expansion.

**Alternative 3** would have additional benefits gained compared to the Proposed Action, particularly from removal of additional conifers in low sage and montane sagebrush steppe and the additional treatment of sagebrush in montane sagebrush steppe and Wyoming sagebrush - loamy.

**Alternatives 4-6** would have much reduced long-term benefits to sage-grouse over the Proposed Action both because there are fewer acres treated and because the treatments would be focused on areas which do not always overlap with the best grouse habitat. The benefits in Alternative 5 would also be reduced because of limited treatment methods. Alternative 6 is especially limited in its benefits to sage-grouse because pinyon-juniper removal is reduced by 50%. Benefits to other wildlife species are also reduced.

## Watershed (Including Water Quality, Floodplains, Riparian Zones)

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↑ | ↑↑ | ↔↑ | ↔↑ | ↔↑ |

**Alternative 1** may have indirect long term adverse effects to watershed resources due to large scale severe wildfires causing erosion, soil hydrophobicity, loss of soil productivity, and loss of riparian vegetation on streambanks.

**Alternative 2** may have minor and short term negative effects to water quality and soils within treatment units but these effects would be outweighed by long term beneficial effects due to reducing the risk of large scale severe wildfire and conversion to cheatgrass.

**Alternative 3** would have effects similar to the Proposed Action with a slightly improved likelihood of beneficial effects due to the mitigation of potential for severe wildfires.

**Alternatives 4-6** would not have as much beneficial watershed effects due to the reduced treatment rates and reduced effectiveness at maintaining a natural fire regime.

## Ecosystem Services

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↔ | ↔ | ↔↓ | ↔↓ | ↔↓ |

**Alternative 1** may have negative effects on wildlife corridors, carbon sequestration, and the gene pool of some ecological systems of the Bodie Hills due to continued pinyon and juniper expansion into shrubland habitats and the risk of severe wildfire.

**Alternative 2** would help maintain the ecosystem services compared to No Action by treating some of the pinyon and juniper expansion and mitigating the risk of severe wildfire.

**Alternative 3** would have similar effects to the Proposed Action in maintaining ecosystem services.

**Alternatives 4-6** would have slightly reduced benefits compared to the Proposed Action resulting in maintenance of ecosystem services or possibly some minor declines similar to the No Action Alternative due to the fact that treatments will not be enough to mitigate the risk of fires outside the natural range of variability.

## Air Quality

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↔ | ↔ | ↓ | ↓ | ↓ |

**Alternative 1** would produce no smoke from prescribed burning, but the increased risk of large wildfires would outweigh this effect resulting in a net negative impact on air quality in the area.

**Alternative 2** would produce some PM-10 emissions from prescribed burning, but the mitigation of risk of wildfire impacts to air quality would have greater beneficial effects in terms of amount of PM-10 emission and number of poor air quality days.

**Alternative 3** would have a greater beneficial impact on the risk of large wildfires degrading regional air quality.

**Alternatives 4-6** would not be very effective at mitigating the risk of poor air quality from large scale fire (see the Fire summary), so would be more similar to No Action than the Proposed Action.

## Recreation

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↔ | ↔ | ↔ | ↔ | ↔ | ↔ |

**Alternative 1-6** are all expected to have no net effect on recreation in the Bodie Hills due to the treatment design features including those that prevent route proliferation and minimize visual effects.

## Visual Quality

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↔ | ↔ | ↔↓ | ↔↓ | ↔↓ |

**Alternative 1** has a possibility of dramatic visual short and long-term effects due to large severe wildfires and their conversion to cheatgrass. These fires would result in large contrasting areas on the landscape visible from a long distance.

**Alternative 2** would result in minor short term contrasts due to the treatments, but the design features would mitigate these impacts, and the indirect effect would be a reduced risk of the large long term visual effects of severe wildfires with No Action.

**Alternative 3** would have similar effects to the Proposed Action with a potential improved long term benefit due to mitigation of large scale wildfires.

**Alternatives 4-6** would have similar short term effects to the Proposed Action but would not be as effective at reducing the risk of large severe wildfires.

## Wilderness Values

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↑ | ↑↑ | ↑↓ | ↔ | ↓ |

**Alternative 1** would have negative impacts on the naturalness and supplemental values of the WSAs and to wilderness characteristics in the Bodie Hills due to the negative impacts on vegetation and wildlife including greater sage-grouse, mule deer, and pronghorn (see vegetation and wildlife).

**Alternative 2** would overall improve the wilderness quality of the WSAs and wilderness characteristics outside the WSAs due to benefits to naturalness and supplemental values. It would have minor short term impacts to solitude, but would overall improve primitive and unconfined recreation opportunities.

**Alternative 3** would have a greater beneficial effect on the naturalness and supplemental values of the WSAs and on wilderness characteristics outside of the WSAs compared to the Proposed Action.

**Alternative 4** would be similar to the Proposed Action in the Mt. Biedeman WSA and similar to the No Action in the Bodie and Bodie Mountains WSAs due to reduced treatment.

**Alternative 5** would be less effective at improving the wilderness quality than the Proposed Action due to reduced treatment and limited methods.

**Alternative 6** would have the same negative impacts on WSAs as No Action due to lack of treatment within the WSAs.

## ACECs

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↔ | ↔↑ | ↔ | ↔↓ | ↔↓ |

**Alternative 1** may have a negative effect on the condition of the ACECs in the project area. Fire is a threat to the Bodie Bowl, continued expansion of pinyon and juniper may affect a small part of Travertine and lack of regeneration of aspen may impact the Conway Summit ACEC.

**Alternative 2** is predicted to have beneficial effects on the Bodie Bowl ACEC by protecting it from wildfire. There may be minor beneficial effects for Travertine and Conway Summit due to the limited amount of treatments that will occur in these two ACECS.

**Alternative 3** is predicted to have similar effects to the Proposed Action.

**Alternative 4** is predicted to have similar effects to the Proposed Action because the ACECs fall within the CWPP WUI footprint.

**Alternatives 5-6** are expected to be similar to the Proposed Action except that benefits to Bodie Bowl ACEC would be reduced because of incomplete fuelbreaks around the State Park.

## Cultural and Historic Resources

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↑ | ↑ | ↔↓ | ↔↓ | ↔↓ |

**Alternative 1** may have negative impacts to cultural and historic resources due to the threat of severe wildfire and wildfire suppression actions, especially for the Bodie Historic District.

**Alternative 2** will protect cultural resources from impacts using standard resource protection measures and would likely have indirect benefits to cultural resources by mitigating the potential for increased wildfire impacts.

**Alternative 3** would have effects similar to the Proposed Action.

**Alternatives 4-6** will protect cultural resources from treatments in the same way as the Proposed Action, but would likely be less effective at protecting cultural resources from severe wildfire, especially in Alternatives 5 and 6 where the fuelbreak around Bodie State Park would be incomplete.

## Wild and Scenic Rivers (Eligible Sections)

| Alternative | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Net Effect | ↓ | ↔ | ↔ | ↔↓ | ↔↓ | ↔↓ |

**Alternative 1** could have negative impacts to the scenic and fish and wildlife outstandingly remarkable values documented in the eligible wild and scenic reaches in the project area due to severe wildfire.

**Alternative 2** would potentially protect the eligible reaches within the project area from severe wildfire.

**Alternative 3** would have similar effects to the Proposed Action.

**Alternatives 4-6** would be less effective at protecting the eligible reaches than the Proposed Action, especially Rough and Atastra Creeks.

## Analysis of Issues

### Ecological Departure

***1. How effective will the treatments be at reducing the departure from the Natural Range of Variability (NRV)?***
***2. How does the use of the NRV as a metric affect the analysis of effects and how is past and future variability accounted for?***
***3. Do the Vegetation Dynamics Development Tool (VDDT) model and Fire Regime Condition (FRC) metric accurately describe the vegetation conditions and the predicted effects of the proposed treatments?***

*Background*
These issues are all related and are best analyzed together. Explanation of the use of Ecological Departure as measured using Natural Range of Variability, VDDT modeling and the FRC metric are included as background to the analysis of the effects of the treatments on Ecological Departure.

In this analysis Ecological Departure was primarily measured using the departure from the Natural Range of Variability. Specifically, the metric used was Fire Regime Condition (FRC) [also known as Fire Regime Condition Class (FRCC) when it is summarized into three classes] and it was calculated using a model developed in the Vegetation Dynamics Development Tool (VDDT). Despite the name, the FRC does not only evaluate the ecological condition relative to fires and fire regimes, but also all other disturbance regimes, heterogeneity, structure and composition. Using these metrics to assess the ecological condition of the Bodie Hills was discussed in a series of three stakeholder workshops that were part of the TNC analysis of ecological condition of the Bodie Hills. The group agreed that these metrics would describe the vegetation conditions in the Bodie Hills that they were interested in and be the most useful in evaluating potential management strategies.

*Definition and calculation of departure from NRV*
Natural range of variability (NRV) describes the amount and types of vegetation states that would be present on the landscape if natural disturbance processes were working without anthropogenic alterations (Provencher, Campbell et al. 2008). In other words, it describes how

much variation there would be on the landscape and what the mosaic of vegetation conditions would look like. It does not assume that environmental conditions are the same as those before European contact or that they are static (Landres, Morgan et al. 1999; Keane, Hessburg et al. 2009). It is important to define the temporal and spatial scales of NRV appropriate to the goals of the project. For this project the spatial scale was defined as the Bodie Hills landscape associated with the lands managed by the BLM (see Figure 1). This landscape has related geology, ecological systems, disturbance regimes, and management history. Management goals for the entire landscape can be set as a unit. The temporal scale used was the present and up to 50 years in the future. This time scale is relevant to management goals. Other time periods were used as reference to try and understand what the NRV might be for this time period. What is known about the vegetation at the time of European contact is relevant because it helps us to understand how the ecosystems worked without the many anthropogenic influences that were introduced by the European settlers including grazing, fire suppression, and the introduction of non-native species. Native peoples were also managing and influencing the structure and composition of ecosystems in the prehistoric period as well but they had a long history with the landscape and the ecological systems that had developed there. Pre-European contact conditions cannot be used alone because the climate during this period was different than today and different from what we expect in the next 50 years relevant to the potential effects of this project. In order to understand what ecosystem dynamics and potentials would be under the predicted climate for the next 50 years the modeling used information from the Medieval Warm Period which is thought to have had climatic conditions similar to what we might experience in the next century. In addition to these past references, the ecological models also incorporate novel conditions such as the introduction of non-native species that change the disturbance regime, but because they are not part of the desired conditions, they are not considered part of the NRV.

In this analysis, Ecological Departure is measured using the departure from NRV calculated using the FRC metric. This is calculated by measuring the current distribution of vegetation classes (as percentages of the entire ecological system in the study area) and then calculating the difference from what is estimated to have been the distribution of vegetation classes under a natural disturbance regime using computer models and all the available scientific information about that ecological system.

This process started with defining models of each ecological system in the Bodie Hills. Ecological systems are the mix of vegetation that can potentially occupy a site with certain physical characteristics. For example, a site might support native grasses and forbs right after it has been disturbed by fire or if it had a different history it might be dominated by exotic annual grasses. That same site might support montane sagebrush 20 years after a fire and also include pinyon and juniper 75 years later. Ecological systems are determined by the physical characteristics of a site which have the potential to support certain kinds of vegetation. The composition of that vegetation will change with time and events that happen to it, but within a certain range. For example a site that is on top of a ridge with very shallow rocky soils may have low sagebrush or scattered forbs and grasses, but it will never support a wet meadow or basin big sagebrush. That site is called a low sagebrush ecological system. These different vegetation classes and the conditions required for them to occur are described in a state and transition model (Westoby, Walker et al. 1989; Bestelmeyer, Herrick et al. 2004). To create the state and transition models, all the available information about the natural disturbance regime was

collected such as fire return intervals, what vegetation states existed before European contact, and alternate states that originate from management or invasion by non-native species. The state and transition model describes the vegetation states, the time it takes to move from one to another and any special conditions or disturbances that are required for the transitions between the different states. The National Resource Conservation Service (NRCS) maps Ecological Sites and creates Ecological Site Descriptions that are robust descriptions of ecological systems. An up to date map of Ecological Sites was not available for the Bodie Hills, so in the TNC analysis, the National Landfire Biophysical Setting models (http://www.landfire.gov) were used as a starting point and the stakeholder workshops were used to help validate the models and collect information that should be included in them specific to the Bodie Hills, especially the uncharacteristic states outside of the reference conditions. The Landfire models are very similar to NRCS Ecological Site Descriptions and can be crosswalked to them when the up to date map and Ecological Site Descriptions become available.

Once ecological systems were defined and modeled, the current vegetation in the Bodie Hills was mapped and classified not only into ecological systems (Montane big sagebrush, low sagebrush etc.), but also into classes that describe its condition. The mapping of current conditions was done using a combination of rules based on the physical limits for different ecological systems, remote sensing and field visits for verification, training the remote sensing model, and assessing the accuracy of the map. See Provencher, Low et al. 2009 for more detail on the mapping process.

In the TNC analysis, a computer program called the Vegetation Dynamic Development Tool (VDDT) was used to calculate the reference conditions (NRV) for each ecosystem type according to the Interagency Landfire FRCC protocol (National Interagency Fuels 2010). The models were run using VDDT to calculate what proportion of states would exist under NRV. For more detailed technical information on this process see Provencher, Low et al. 2009 and the Interagency Fire Regime Condition Class (FRCC) Guidebook version 3.0 (National Interagency Fuels 2010). All the Ecological systems and the classes defined within them that were developed for this project are listed in Appendix B.

Finally, the departure from NRV was calculated by simply comparing the difference in abundance of each class between the NRV and the current conditions resulting in a percentage departure from 1 to 100. When this departure is summarized in three classes it is called FRCC (Fire Regime Condition Class). Despite the name, FRCC does not only describe characteristics related to fire regimes, but can be used to evaluate ecological condition related to other disturbance types, management history and the introduction of non-native species.

The analysis of the alternatives uses calculations of the current departure from NRV as well as estimates of what the departure from NRV would be after 20 and 50 years after implementing each alternative. Provencher, Low et al. used the VDDT program to project the effects of different management scenarios to calculate the change in the departure from NRV (2009). These computer models included the continued succession and change in plant communities, natural disturbance events such as fires and insect outbreaks, and the proposed treatments with associated outcomes and failure rates.

Accounting for changing conditions and stochastic events:
There have been criticisms of using NRV to set desired conditions for current and future ecosystems when it is based on the Historic Range of Variability especially from the pre-Euroamerican contact time period when the climate was wetter and cooler than it is now or will likely be in the near future (Millar and Woolfenden 1999). NRV as it is used in this analysis does not assume that environmental conditions are the same as they were at a certain point in time, pre-1860 for example. Changing climate has been incorporated into the analysis. The analysis used climate projections for the next 50 years and selected real climate data from time periods during the Holocene that mimic what is predicted to happen in the future rather than using current weather in the scenarios. Stochastic events such as fire and insect outbreaks were included in the model. Fire histories from neighboring landscapes were sampled and used to create fire events in 5 different runs of the model. See the Provencher, Low et al. 2009 report, pgs. 42-44 for more detail.

*High Risk Classes*
In some cases, the calculation of FRCC does not completely capture the Ecological Departure of some landscapes or the risk that vegetation states will cross a threshold to become uncharacteristic states that are very difficult to restore. In addition to FRCC as a metric for measuring Ecological Departure the Provencher, Low et al. 2009 report also examined High Risk vegetation classes. These are classes of vegetation which may put an ecological system at risk of large shifts such as conversion to non-native species. The public workshop participants who helped to shape the analysis of ecological condition chose to use High Risk vegetation classes as a second measure of the condition of the vegetation in the Bodie Hills because the uncharacteristic classes are all treated the same in the calculation of Ecological Departure using the Fire Regime Condition metric. This obscures some vegetation dynamics that are very important to wildlife habitat and disturbance regimes. The pattern for High Risk classes is somewhat different than Ecological Departure as measured with FRCC. In some ways it can be seen as predictive of what will happen to Ecological Departure in the future.

*Acres of Key Classes Created*
For this analysis, because treatments at a scale large enough to reverse Ecological Departure is precluded by limits in the RMP and the Fire Management Plan, we also looked at the absolute value of the acres of key classes that would be created by the treatments. The Ecological Departures in the systems selected for treatment are caused by the overrepresentation of late seral classes and the rarity on the landscape of early seral classes. These early seral classes are important to wildlife habitat, fire regimes, and ecological functions. We calculated the number of acres that would be created in the first two seral classes (A and B – see Appendix B Ecological System Descriptions) and compared it to the current acres in those classes within the Bodie Hills landscape. The amount of pinyon and juniper expansion into the target ecological systems is also a key factor for wildlife habitat and fire regimes, so we also calculated the number of acres of expansion trees that would be removed to provide open shrubland habitats.

Reliability of the FRCC protocol and metric for describing ecological condition:
The land management agencies of the Department of the Interior and the Department of Agriculture have adopted FRCC as a metric for describing ecological condition across multiple scales. The attendees at the public workshops that were part of the TNC analysis came to

consensus that FRCC was the best overall metric to describe the ecological conditions of the Bodie Hills when applied with models adapted for the local systems and new local mapping. There have been authors who have criticized the use of FRCC because it can be misapplied (Aplet and Wilmer 2005). It is important to appropriately define the reference conditions and use data that is of the appropriate scale. As discussed above the model of the range of variability cannot assume that past or current conditions will be the same as the future (Millar and Woolfenden 1999). It is also important to define a project area that is at the appropriate scale and use data that are measured at that scale.

The National Landfire project developed maps of FRCC at a national scale that are available on the web (www.landfire.gov) (Rollins 2009). These data are appropriate for evaluating conditions at a regional level only. They are not appropriate for planning project level activities (Schmidt, Menakis et al. 2002). On the other end of the spectrum, FRCC is not appropriate for evaluating a single patch or stand where a treatment will be applied. It is a landscape measure of heterogeneity and how it relates to disturbance regimes. In order to evaluate how disturbances are working, a large enough area has to be considered. For landscapes that have related disturbance regimes and ecological systems, FRCC can be used to usefully describe conditions as long as it is calculated using appropriately scaled data rather than the off the shelf national level data from Landfire.

FRCC is scientifically developed and peer reviewed and it has been used in multiple peer reviewed studies similar to this application in the Bodie Hills (Forbis, Provencher et al. 2007; Provencher, Campbell et al. 2008; Rollins 2009). Measures of departure from the Natural Range of Variability, although not called FRCC, have also been used in multiple planning efforts and peer reviewed studies including some in ecological types similar to the Bodie Hills (Hemstrom, Wisdom et al. 2002). Reviews of the use of departure from the Range of Natural Variability as a measure and a planning tool have concluded that it is a useful metric that must be interpreted and implemented appropriately, but is a key tool in the absence of any better methods that have yet been developed (Landres, Morgan et al. 1999; Keane, Hessburg et al. 2009).

For this analysis, the criticisms of the use of departure from NRV or FRCC have been addressed in the methodology. The reference conditions were carefully considered and selected to be appropriate for the current and near future (50 years) timeframes of the analysis. These conditions were vetted publicly in the workshops as a part of the TNC analysis to incorporate as much local and expert knowledge as possible. Climatic conditions that were used were taken from the Medieval Warm Period to be most similar to the expected conditions over the next 50 years. The fire conditions used were from areas that have already experienced more frequent fire as is predicted for the Bodie Hills during the analysis period. The definitions of the ecological systems and the state and transition models that describe them were also adapted for the local conditions and included information from the public workshops as well as all the available scientific literature and accepted models that have been peer reviewed. The mapping was done at the scale of the project with the locally defined ecological systems and states. See the Provencher, Low et al. report for details on the methods used (2009).

*Alternative 1: No Action*

*Direct and Indirect Effects*

Despite continued fire suppression and no program of vegetation treatment under the No Action Alternative, Ecological Departure was not predicted to increase in any of the target ecosystems except Mountain Shrub and in some cases, may in fact go down due to increased wildfire activity. See the predicted values for Ecological Departure in **Table 8** below and in the summary graphs in Figure 7, Figure 8, and Figure 9 at the end of the analysis for this issue. Ecological departure does not continue to increase over the next 20 to 50 years because most of the ecological systems are already dominated by old vegetation classes. As these systems continue to age they do not change to a different class, unless affected by wildfire or conversion to an uncharacteristic class. The modeling used to estimate the changes in Ecological Departure over time assumed that there may be an increase in wildfire activity. This was based on the wildfire activity observed over the last 25 years in adjacent landscapes. These nearby similar areas all have experienced greater amounts of wildfire than the Bodie Hills landscape. This combined with the current upward trend in wildfire activity (Miller, Safford et al. 2009) and predictions for greater wildfire under climate change models all make increasing wildfire in the Bodie Hills very likely. A more in depth discussion of the model results and the interpretation of the changes in Ecological Departure are in Provencher, Low et al. 2009 which is incorporated by reference.

**Table 8.** Changes in Ecological Departure (Fire Regime Condition) with No Action. Values are derived from the modeling in Provencher,Low et al. 2009. Current Ecological Departure is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected Ecological Departure is modeled based on expected natural disturbances and aging of current vegetation (See Provencher,Low et al. 2009 for detailed methods).

| **Alt. 1: No Action** | | | |
|---|---|---|---|
| | **Ecological Departure (FRC)** | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **No Action 50 yrs** |
| Basin wildrye-big sagebrush | 73 | 72 | 68 |
| Low sagebrush | 41 | 33 | 21 |
| Montane sagebrush steppe | 73 | 58 | 51 |
| Mountain shrub | 40 | 38 | 53 |
| Wyoming sagebrush - loamy | 74 | 67 | 70 |
| Wyoming sagebrush - sandy | 99 | 99 | 99 |
| Montane riparian | 22 | 23 | 27 |
| Stable aspen | 41 | 41 | 39 |
| Wet Meadow | 33 | 18 | 35 |

High Risk Vegetation Classes:

In some ecological systems, there may be a continued increase in High Risk Classes under the No Action Alternative. This is because the dynamic of High Risk vegetation is due primarily to continued invasion of non-native species such as cheatgrass or increases in native species that are normally controlled by fire such as pinyon and juniper.

The proportion of High Risk vegetation is expected to stay the same in 4 of the 9 target ecological systems. In three of the ecological systems (low sagebrush, montane riparian, and wet

meadows) it is expected to increase. In two ecological systems (Wyoming sagebrush – sandy and stable aspen) it is expected to decline primarily because of the assumed increase in wildfire activity. See the table below and the graphs in the summary at the end of this analysis of this issue.

**Table 9**. Changes in High Risk vegetation classes with No Action. Values are derived from the modeling in Provencher,Low et al. 2009. Current High Risk vegetation is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected High Risk vegetation is modeled based on expected natural disturbances and aging of current vegetation (See Provencher,Low et al. 2009 for detailed methods).

| **Alt. 1: No Action** | | | |
|---|---|---|---|
| | **High Risk Vegetation Classes (%)** | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **No Action 50 yrs** |
| Basin wildrye-big sagebrush | 63 | 62 | 67 |
| Low sagebrush | 1 | 9 | 15 |
| Montane sagebrush steppe | 27 | 25 | 26 |
| Mountain shrub | 0 | 0 | 0 |
| Wyoming sagebrush - loamy | 57 | 49 | 47 |
| Wyoming sagebrush - sandy | 99 | 80 | 56 |
| Montane riparian | 0 | 9 | 18 |
| Stable aspen | 41 | 28 | 16 |
| Wet Meadow | 0 | 4 | 12 |

Acres of Key Classes Created:
Early seral vegetation classes are currently very under-represented in the Bodie Hills landscape compared to what would be expected under the Natural Range of Variability. Under the No Action Alternative no additional early seral acres would be created except by natural processes. Tree expansion is occurring rapidly in most of the ecological systems included in this analysis and is reducing the amount of open shrubland habitat available. Tree expansion is also filling in gaps between existing true old growth pinyon groves making them susceptible to fire. Under the No Action Alternative Alternative, there would be no treatment of trees expanding into shrubland ecological systems, therefore, the expansion process would continue, resulting in an increase of the total acres of tree expansion from the current values.

**Table 10.** Acres of underrepresented early seral classes (A and B) created by the No Action Alternative and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 1: No Action** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 0 | 0% | 260 | 0 | 0% |
| Low sagebrush | 629 | 0 | 0% | 5458 | 0 | 0% |
| Montane sagebrush steppe | 8132 | 0 | 0% | 38607 | 0 | 0% |
| Mountain shrub | 742 | 0 | 0% | 687 | 0 | 0% |
| Wyoming sagebrush – loamy | 0 | 0 | 0% | 1662* | 0 | 0% |
| Wyoming sagebrush – sandy | 0 | 0 | 0% | 213* | 0 | 0% |
| Montane riparian | 55 | 0 | 0% | 0 | 0 | 0% |
| Stable aspen | 524 | 0 | 0% | 1432 | 0 | 0% |
| Wet Meadow | 1219 | 0 | 0% | 0 | 0 | 0% |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative Effects*

Analysis Area:

The cumulative effects analysis area for Ecological Departure and effects to vegetation is the entire Bodie Hills landscape, an area approximately 390,000 acres in size, 2.3 times larger than the BIFO managed lands in the project area that also includes the private lands and the adjacent lands managed by the Humboldt-Toiyabe National Forest (See Figure 6). The valleys around it separate it from the adjacent mountain ranges and make it a natural unit with related vegetation communities. The area is roughly defined by the Mono Basin to the south, Conway Summit, the Bridgeport Valley to the east and the East Walker River, the lower reaches of Rough Creek to the confluence with Bodie Creek and over the divide to Alkali Valley on the east side. This analysis area was chosen because Ecological Departure is only relevant in a landscape context with related vegetation. Ecological Departure compares the different states of each vegetation type and how much of each there are in that landscape. As soon as the vegetation types and disturbance regimes change they can no longer be compared. At a smaller scale comparisons are not valid because not enough of the variation in the condition of vegetation on the landscape has been compared.

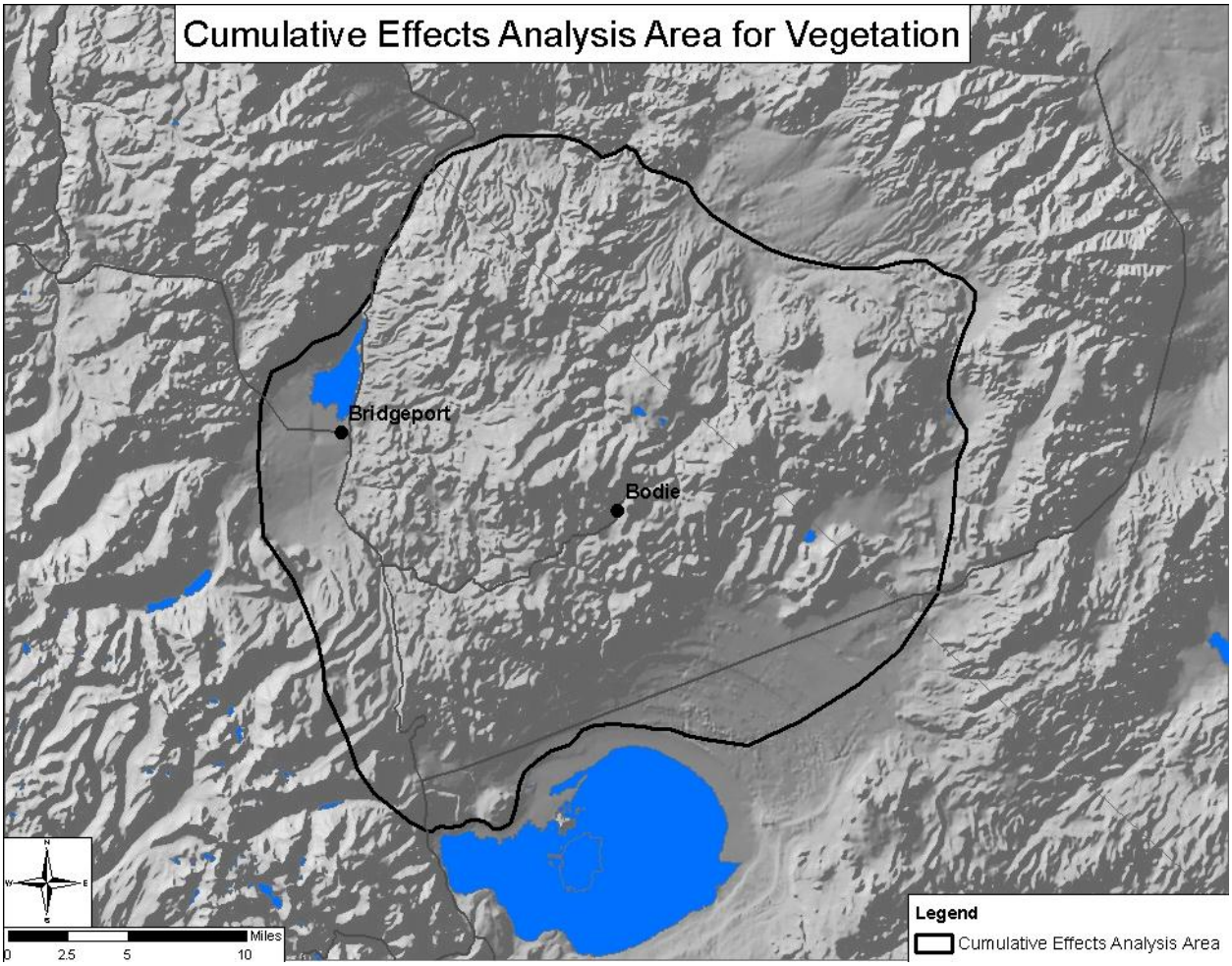



**Figure 6.** Map of Cumulative effects analysis area used for vegetation effects.

Analysis:
There are no cumulative effects on Ecological Departure due to past or current actions for the No Action Alternative because all the current and past management in the Bodie Hills are part of the analysis of the direct and indirect effects. Effects of ongoing management such as the small scale vegetation management projects that have already been implemented, fire suppression, and grazing by livestock are included in the assessment of current conditions as well as the modeling of future conditions.

There are several future actions that have potential to have cumulative effects on Ecological Departure when combined with the No Action Alternative. Potential future changes in grazing management, mining, fire and fire suppression, and vegetation management projects on private lands were considered. The analysis found that changes in grazing management and mining were not certain and could not be predicted therefore they are not reasonably foreseeable. Some vegetation management on private lands is already planned so it is reasonably foreseeable.

Grazing:
The active range allotments in the project area are Aurora Canyon, Potato Peak, Bodie Mountain, part of Mono Sand Flat, Mount Biedeman, Rancheria Gulch, Mormon Ranch, Little Mormon,

Travertine Hills, Dog Creek, Green Creek, West Reservoir, and Walter's Ranch. In general, the allotments are in compliance with the Bishop RMP and have met the Rangeland Health Standards and Guidelines criteria (USDI BLM 1993a). There are no changes in grazing management that are reasonably foreseeable because the BLM is in the process of analyzing the effects of permit issuance on most of the allotments in the project area or the decision to reissue permits has been challenged in a lawsuit. The outcome of these analyses and legal challenges are unknown so the effects cannot be predicted. For the Aurora Canyon, Potato Peak, Bodie Mountain and Mono Sand Flat allotments, permits were issued but there is a pending lawsuit challenging those decisions. The long term trend monitoring for some of the allotments have been conducted from the 1960 or 1970's to present. The trend has been static or upward in these allotments over this time period. These current conditions and trends were incorporated in the modeling of the effects of the no action alternative.

Mining:
There has been local publicity about the potential for a mining company, Cougar Gold, to begin operations in the Bodie Hills. Several individuals and groups commented on this potential in response to scoping for this EA. In 2009 a decision was signed based on the Cougar Gold Paramount Exploration Proposal EA allowing for exploratory mineral drilling of eleven holes at eight locations in the Bodie Hills. It was determined to be a continuation of mineral uses occurring in the project area prior to the passage of the Federal Land Policy and Management Act of 1976 (FLPMA). The mining company has not applied for a further exploration or for full scale mine development. As a general rule, exploration activity does not often advance to a full scale mine development. About 0.01% of exploration drilling programs lead to mine plans and production. Any further activity will require NEPA analysis with full public involvement.
The potential for any application for exploration or mining activity to be submitted and the outcome of any possible NEPA analysis are unknown so it is not reasonably foreseeable. It is unclear what effect mining activities would have on Ecological Departure and other resources. If a specific proposal is submitted, the NEPA analysis will address the potential effects and cumulative effects with other programs such as this project.

Fire and Fire Suppression:
Fire is an ongoing disturbance factor that has and will influence the vegetation and the ecological departure of the Bodie Hills. It is expected to change in the future due to climate change and the current high level of ecological departure of the ecological systems. This expected change was incorporated in the modeling of the vegetation conditions under the No Action Alternative and was described in the direct and indirect effects of the No Action. Therefore it is not considered as a cumulative effect.

Likewise, fire suppression has been an influence on the vegetation of the Bodie Hills for at least the last half century and is expected to continue under the No Action Alternative because of the resources that must be protected including economic, cultural, and natural resources. The effectiveness of fire suppression is expected to change in the future because of the ecological departure, increasing cheatgrass and climate change (see the analysis of Issue #5). More fires are expected to escape control and more acres are expected to burn. However, this effect was included in the modeling of the vegetation conditions under all the alternatives and therefore is not also analyzed as a cumulative effect.

Vegetation Management on Private lands:
The analysis of Ecological Departure in the Bodie Hills conducted by the BLM and The Nature Conservancy from 2007 to 2009 was designed to be all-lands focused and result in the basis for cooperative actions that could be taken on all land ownerships. There are several land owners who have already taken action or are planning to implement vegetation management projects on their lands to improve ecological condition with support from the results of the BLM/TNC analysis. These are mostly focused on wet meadow vegetation along with some focused on removing pinyon and juniper from montane and low sagebrush ecological systems. These projects should help to reduce the ecological departure of these systems, however, based on the analysis of the potential effects of the Proposed Action (see below) where the much larger acreages will not have large effects on Ecological Departure, the cumulative effects of these projects combined with the No Action Alternative are not expected to have a measurable effect on the total Ecological Departure at the scale of the Bodie Hills.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The modeling in Provencher, Low et al. predicted that the Proposed Action, if continued over a period of 20 years, would reduce the Ecological Departure compared to the No Action Alternative in three of the target upland ecological systems (basin wildrye – big sagebrush, montane sagebrush steppe, Wyoming sagebrush – loamy) and would contribute to the reduction of ecological departure compared to the No Action Alternative in two of the associated riparian ecological systems (montane riparian and stable aspen) (2009). If continued over 50 years, it would further reduce the ecological departure in those systems and also wet meadow. See the table below for predicted values of Ecological Departure and the graphs in the summary section at the end of the analysis of this issue.

**Table 11.** Changes in Ecological Departure (Fire Regime Condition) under the Proposed Action. Values are derived from the modelin in Provencher,Low et al. 2009 (see the WUI-ROI scenario). Current and predicted Ecological Departure with No Action are also included for comparison. Current Ecological Departure is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected Ecological Departure is modeled based on expected natural disturbances and aging of current vegetation along with the treatments in the Proposed Action (See Provencher,Low et al. 2009 for detailed methods). Values with a single asterisk are marginally significantly different from the No Action Alternative based on 5 different model runs. Those with two asterisks were statistically significantly different from the No Action Alternative.

| **Alt. 2: Proposed Action** | | | | | |
|---|---|---|---|---|---|
| | **Ecological Departure (FRC)** | | | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **Proposed Action 20 yrs** | **No Action 50 yrs** | **Proposed Action 50 yrs** |
| Basin wildrye-big sagebrush | 73 | 72 | 58 | 68 | 31 |
| Low sagebrush | 41 | 33 | 33 | 21 | 26 |
| Montane sagebrush steppe | 73 | 58 | 45 | 51 | 33* |
| Mountain shrub | 40 | 38 | 43 | 53 | 53 |
| Wyoming sagebrush – loamy | 74 | 67 | 68 | 70 | 72 |
| Wyoming sagebrush – sandy | 99 | 99 | 99 | 99 | 99 |
| Montane riparian | 22 | 23 | 16 | 27 | 19 |
| Stable aspen | 41 | 41 | 37 | 39 | 19** |
| Wet Meadow | 33 | 18 | 19 | 35 | 26** |

High Risk Vegetation Classes:
As discussed above in the effects of the No Action Alternative, the proportion of high risk vegetation classes can increase in an ecological system without a change in the Ecological Departure, but setting the stage for a potential large shift in the Ecological Departure in the future. The public group that participated in the analysis chose to use High Risk Vegetation as a second measure to understand the condition of the vegetation in the Bodie Hills in order to account for this.

The Proposed Action would reduce the proportion of High Risk Vegetation compared with the No Action Alternative in four of the target ecological systems if continued for 20 years (basin wildrye – big sagebrush, low sagebrush, Wyoming sagebrush – loamy, and Wyoming sagebrush - sandy) and in all three of the associated riparian systems. If continued for 50 years it would also reduce High Risk Vegetation in Montane sagebrush steppe in comparison to the No Action Alternative. In some cases the proportion of High Risk Vegetation is expected to increase dramatically in the No Action Alternative over time so the effect of the Proposed Action is to reduce the amount of increase rather than reduce the amount compared to the current conditions. See the table below of proportions of High Risk Vegetation currently and at 20 and 50 years under a program like the Proposed Action.

**Table 12.** Changes in the proportion of High Risk vegetation under the Proposed Action. Values are derived from modeling in Provencher,Low et al. 2009 (see the WUI-ROI scenario). Current and predicted proportions of High Risk Vegetation with No Action are also included for comparison. The current proportion of High Risk vegetation is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected High Risk vegetation is modeled based on expected natural disturbances and aging of current vegetation along with the treatments in the Proposed Action (See Provencher,Low et al. 2009 for detailed methods). Values with a single asterisk are marginally significantly different from the No Action Alternative based on 5 different model runs. Those with two asterisks were statistically significantly different from the No Action Alternative.

| **Alt. 2: Proposed Action** | | | | | |
|---|---|---|---|---|---|
| | **High Risk Vegetation Classes (%)** | | | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **Proposed Action 20 yrs** | **No Action 50 yrs** | **Proposed Action 50 yrs** |
| Basin wildrye-big sagebrush | 63 | 62 | 23** | 67 | 14** |
| Low sagebrush | 1 | 9 | 8 | 15 | 9* |
| Montane sagebrush steppe | 27 | 25 | 25 | 26 | 20** |
| Mountain shrub | 0 | 0 | 0 | 0 | 0 |
| Wyoming sagebrush - loamy | 57 | 49 | 43 | 47 | 39 |
| Wyoming sagebrush - sandy | 99 | 80 | 65 | 56 | 35 |
| Montane riparian | 0 | 9 | 2** | 18 | 5** |
| Stable aspen | 41 | 28 | 9** | 16 | 1** |
| Wet Meadow | 0 | 4 | 1** | 12 | 3** |

Acres of Key Classes Created:

Even where the treatments are not enough to change the Ecological Departure across the whole landscape in comparison to the No Action Alternative, the Proposed Action would create acres of early seral classes that are currently largely missing from the Bodie Hills landscape. The Proposed Action would approximately double the current area of early seral classes in shrubland types (increases range from 92% to 135%) (Table 13). In Wyoming sagebrush types there are currently no early seral acres mapped, and the Proposed Action would add 750 acres. It would also remove expanding trees from key shrubland habitats creating a total of 3720 acres of open habitat (See Table 13). Because the tree expansion will continue throughout the 10 year period, tree removal may not result in a total reduction in the amount of acres of shrubland occupied by trees. However, it will ensure that the treated acres remain shrubland types that can be used by wildlife species that depend on them (see wildlife analysis in Issues 12 and 13). These areas of tree removal will also provide openings between the existing trees that will reduce or alter fuel loading, which can change the ability of fire to spread and help maintain the natural fire regime (See the fire analysis in Issue 5). The table below lists the acreage of the key classes that will be created by the Proposed Action.

**Table 13.** Acres of underrepresented early seral classes (A and B) created by the Proposed Action and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 2: Proposed Action** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 230 | 92% | 260 | 120 | 46% |
| Low sagebrush | 629 | 800 | 127% | 5458 | 1250 | 23% |
| Montane sagebrush steppe | 8132 | 9800 | 121% | 38607 | 750 | 2% |
| Mountain shrub | 742 | 1000 | 135% | 687 | 0 | 0% |
| Wyoming sagebrush - loamy | 0 | 250 | undefined | 1662* | 600* | 36%* |
| Wyoming sagebrush - sandy | 0 | 500 | undefined | 213* | 1000* | 469%* |
| Montane riparian | 55 | 30 | 55% | 0 | 0 | NA |
| Stable aspen | 524 | 500 | 95% | 1432 | 500 | 35% |
| Wet Meadow | 1219 | 100 | 8% | 0 | 0 | NA |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative effects*

See the analysis under the No Action Alternative for a definition of the analysis area and the potential past, current, and future actions that might have a cumulative effect when combined with the alternatives. Grazing and mining were ruled out has having any cumulative effects. The vegetation management projects conducted and planned by private land owners in the project area is expected to have a small effect on the ecological departure of the target ecological systems. Together with the Proposed Action, this would be expected to increase the reduction of Ecological Departure and High Risk Vegetation, but the magnitude of the additional reduction is expected to be too small to measure in upland systems which primarily occur on federally managed lands. For the associated riparian systems that which are often heavily privately managed the effect will be larger and should measurably contribute to reducing the Ecological Departure.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The effects of the Increased Acreage Alternative are expected to be similar to the Proposed Action in the majority of the ecological systems. For 6 of the Ecological Systems, the treatments are identical and the effects are expected to be the same as the Proposed Action. For the 3 systems that have increased treatment, low sagebrush, montane sagebrush, and Wyoming sagebrush – loamy, the modeling predicted that Ecological Departure would be further reduced compared to the Proposed Action at varying amounts (See Table 14 below and the summary graphs in Figure 7, Figure 8, and Figure 9 at the end of the analysis of this issue). These modeling results come from the scenario described in the Provencher, Low et al. report as the

"Ecological Management Scenario" (2009). The greatest effect was in Wyoming sagebrush – loamy where the Proposed Action did not measurably lower Ecological Departure, but it did have a statistically significant effect at the Increased Acreage levels. The treatments in the Increased Acreage Alternative for Low Sagebrush and Montane Sagebrush are slightly different than what was modeled in the Ecological Management Scenario in Provencher, Low et al. (2009). The treatments modeled in Provencher, Low et al. for Low Sagebrush emphasized early sheep grazing but the modeling found that this would not have a measureable effect on Ecological Departure (2009). Based on this result, the Increased Acreage Alternative for Low Sagebrush in this document increases the amount of mechanical treatment instead. Because of the slow changes in low sagebrush with natural fire playing a larger role than treatment, this would likely reduce the Ecological Departure very little but have a large effect on High Risk Vegetation (see below). For Montane sagebrush the Provencher analysis also modeled large acreages of early spring grazing which did not have a large effect on Ecological Departure, but greatly reduced High Risk Vegetation (2009). The treatments proposed in this alternative do not include grazing except around Bodie State Park. They are expected to lower Ecological Departure more than the Proposed Action based on the effectiveness of the same treatments at a lower level in the Proposed Action.

**Table 14.** Changes in Ecological Departure (Fire Regime Condition) for the three ecological systems with increased treatment under Alternative 3. (See tables for Proposed Action for the predicted Ecological Departure for the other ecological systems.) Values are based on the results of modeling in Provencher, Low et al. 2009 (see the Ecological Management scenario). Current and predicted Ecological Departure with No Action are also included for comparison. Current Ecological Departure is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected Ecological Departure is modeled based on expected natural disturbances and aging of current vegetation along with the treatments in Alternative 3 (See Provencher, Low et al. 2009 for detailed methods). Values with a single asterisk are marginally significantly different from the No Action Alternative based on 5 different model runs. Those with two asterisks were statistically significantly different from the No Action Alternative. Values that had to be estimated due to differences from the scenario modeled in Provencher report are shown just as less than the Proposed Action value (2009).

| **Alt. 3: Increased Acreage** | | | | | |
|---|---|---|---|---|---|
| | **Ecological Departure (FRC)** | | | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **Alt. 3 20 yrs** | **No Action 50 yrs** | **Alt. 3 50 yrs** |
| Low sagebrush | 41 | 33 | *<33* | 21 | *<26* |
| Montane sagebrush steppe | 73 | 58 | *<45* | 51 | *<33* |
| Wyoming sagebrush - loamy | 74 | 67 | 56** | 70 | 52** |

High Risk Vegetation:
As discussed above in the effects of the No Action Alternative, the proportion of high risk vegetation classes can increase in an ecological system without a change in the Ecological Departure, but setting the stage for a potential large shift in the Ecological Departure in the future. The public group that participated in the analysis chose to use High Risk Vegetation as a second measure to understand the condition of the vegetation in the Bodie Hills in order to account for this.

For the three ecological systems that have increased treatment in this alternative compared to the Proposed Action, the modeling suggests that 20 years of treatment at this level would slightly reduce High Risk Vegetation in low sagebrush and montane sagebrush compared to the Proposed Action. Although the difference from the Proposed Action and current conditions is slight in these two ecological systems, it is very important due to the extent of the montane sagebrush which is the largest ecological system in the Bodie Hills and the importance of the low sagebrush ecological system to wildlife such as sage-grouse (see the wildlife analysis in Issue 12).

The model results predict that the Increased Acreage Alternative would greatly reduce High Risk vegetation in Wyoming sagebrush – loamy. The additional reduction in High Risk Classes compared to the Proposed Action in Wyoming sagebrush – loamy can only be accomplished with high cost treatment methods, mowing or burning followed by seeding. The costs for the increased acreages would be 20 times greater than the Proposed Action in this ecological system (Provencher, Low et al. 2009 pg. 113).

**Table 15.** Changes in Ecological Departure (Fire Regime Condition) for the three ecological systems with increased treatment under Alternative 3. (See tables for Proposed Action for the predicted Ecological Departure for the other ecological systems.) Values are based on the results of modeling in Provencher, Low et al. 2009 (see the Ecological Management scenario). Current and predicted Ecological Departure with No Action are also included for comparison. Current Ecological Departure is calculated from actual mapped distribution of vegetation conditions across the Bodie Hills. Projected Ecological Departure is modeled based on expected natural disturbances and aging of current vegetation along with the treatments in Alternative 3 (See Provencher, Low et al. 2009 for detailed methods). Values with a single asterisk are marginally significantly different from the No Action Alternative based on 5 different model runs. Those with two asterisks were statistically significantly different from the No Action Alternative. Values that had to be estimated due to differences from the scenario modeled in Provencher report are shown just as less than the Proposed Action value (2009).

| **Alt. 3: Increased Acreage** | | | | | |
|---|---|---|---|---|---|
| | **High Risk Vegetation Classes (%)** | | | | |
| **Ecological system** | **Current** | **No Action 20 yrs** | **Alt. 3 20 yrs** | **No Action 50 yrs** | **Alt. 3 50 yrs** |
| Low sagebrush | 1 | 9 | *<8* | 15 | *<9** |
| Montane sagebrush steppe | 27 | 25 | *<25* | 26 | *<20*** |
| Wyoming sagebrush - loamy | 57 | 49 | 25** | 47 | 20** |

Acres of Key Classes:
The Increased Acreage Alternative would create key classes in the Bodie Hills Landscape at the same rate as the Proposed Action except in some important ecological systems where the amount would be increased. It would create more early seral acres in montane sagebrush and Wyoming sagebrush – loamy and would remove more expanding trees from low sagebrush and montane sagebrush (See Table 16).

**Table 16.** Acres of underrepresented early seral classes (A and B) created by the Increased Acreage Alternative and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 3: Increased Acreage** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 230 | 92% | 260 | 120 | 46% |
| Low sagebrush | 629 | 800 | 127% | 5458 | 2200 | 40% |
| Montane sagebrush steppe | 8132 | 12600 | 155% | 38607 | 1400 | 4% |
| Mountain shrub | 742 | 1000 | 135% | 687 | 0 | 0% |
| Wyoming sagebrush - loamy | 0 | 2800 | undefined | 1662* | 600* | 36%* |
| Wyoming sagebrush - sandy | 0 | 500 | undefined | 213* | 1000* | 469%* |
| Montane riparian | 55 | 30 | 55% | 0 | 0 | NA |
| Stable aspen | 524 | 500 | 95% | 1432 | 500 | 35% |
| Wet Meadow | 1219 | 100 | 8% | 0 | 0 | NA |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative Effects*

The cumulative effects of the Increased Acreage Alternative are predicted to be the same as the Proposed Action (see above). The only action that would have cumulative effects with the Increased Acreage Alternative would be the vegetation treatments being implemented and planned on private lands. These would slightly increase the reduction of Ecological Departure mostly in riparian systems.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The WUI Only Alternative reduces the amount of treatment to 61% of the Proposed Action. This Alternative was not modeled in Provencher, Low et al. so the effects must be estimated by comparison to the Proposed Action which shows the effects within the WUI and the No Action Alternative which shows the effects outside the WUI (2009). Overall, the effects would be expected to be intermediate between the No Action and the Proposed Action on the graphs in Figure 7, Figure 8, and Figure 9 in the summary at the end of the analysis of this issue. The proportion of each ecological system to be treated is different because of their distribution on the landscape.

Basin wildrye – big sagebrush:

The WUI contains 68% of the ecological system in the Bodie Hills. Treatment of 68% of this system would likely result in a very small reduction in Ecological Departure compared to No Action over 20 years and a larger more measurable amount if continued over 50 years. The reduction in High Risk Classes would be expected to be important.

Low sagebrush:
The WUI contains only 37% of the low sagebrush ecological system. The Ecological Departure would be expected to be reduced by wildfire activity only. Even treatment at the Proposed Action levels is not enough to reduce the Ecological Departure measurably. Over the 20 year timeframe treatment of only 37% of the system also not likely to reduce High Risk vegetation classes. It may start to have an effect over a 50 year time frame.

Montane sagebrush steppe:
The WUI contains 60% of the ecological system. Reductions in Ecological Departure and High Risk Classes under this alternative are expected to be very small.

Mountain shrub:
The WUI contains 85% of the Mountain Shrub ecological system. None of the alternatives are expected to reduce Ecological Departure or High Risk Classes.

Wyoming sagebrush – loamy:
The WUI contains 100% of this ecological system in the Bodie Hills so the effects are expected to be the same as the Proposed Action, no reduction in Ecological Departure and a small reduction in High Risk Classes.

Wyoming sagebrush – sandy:
The WUI contains 59% of this ecological system. None of the alternatives are expected to be able to reduce Ecological Departure. The WUI only Alternative would likely slightly reduce High Risk Classes which are very abundant in this system.

Montane riparian:
The WUI contains 91% of this ecological system so the effects are expected to be similar to the Proposed Action, reducing both Ecological Departure and High Risk Classes.

Stable aspen:
The WUI contains only 46% of this ecological system. Ecological Departure would not be likely to be reduced at this treatment level unless treatments were continued for 50 years. High Risk Classes would be slightly reduced compared to No Action.

Wet meadow:
The WUI contains 66% of the wet meadows. Ecological Departure would not be reduced by this level of treatment or by the Proposed Action unless continued for 50 years. High Risk Classes would likely be reduced by a small amount compared to No Action.

Acres of Key Classes:
The CWPP WUI Alternative would create few acres of key classes in the Bodie Hills landscape than the Proposed Action in most ecological systems. It would increase the amount of early seral from 64% to 115% in shrubland ecological systems, and create a total of 2180 acres of open shrubland habitats in areas currently converted to trees (see Table 17).

**Table 17.** Acres of underrepresented early seral classes (A and B) created by the CWPP WUI Alternative and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 4: CWPP WUI** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 160 | 64% | 260 | 80 | 31% |
| Low sagebrush | 629 | 460 | 73% | 5458 | 460 | 8% |
| Montane sagebrush steppe | 8132 | 5920 | 73% | 38607 | 450 | 1% |
| Mountain shrub | 742 | 850 | 115% | 687 | 0 | 0% |
| Wyoming sagebrush - loamy | 0 | 250 | undefined | 1662* | 600* | 36%* |
| Wyoming sagebrush - sandy | 0 | 295 | undefined | 213* | 590* | 277%* |
| Montane riparian | 55 | 27 | 49% | 0 | 0 | NA |
| Stable aspen | 524 | 230 | 44% | 1432 | 230 | 16% |
| Wet Meadow | 1219 | 66 | 5% | 0 | 0 | NA |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative Effects*

The cumulative effects of the WUI Only Alternative are predicted to be similar to the Proposed Action (see above). The only action that would have cumulative effects when combined with the WUI Only Alternative would be the vegetation treatments being implemented and planned on private lands. These would slightly increase the reduction of Ecological Departure mostly in riparian systems.

*Alternative 5: Limited treatment in WSAs*

*Direct and Indirect Effects*

The Limited Treatment in WSAs Alternative reduces the amount of treatment to 76% of the Proposed Action. This Alternative was not modeled in Provencher, Low et al. so the effects must be estimated by comparison to the Proposed Action which shows the effects within the outside of the WSAs and the No Action Alternative which shows the effects of doing very little treatment (current conditions) (2009). Overall, the effects would be expected to be intermediate between the No Action and the Proposed Action on the graphs in Figure 7, Figure 8, and Figure 9 in the summary at the end of the analysis of this issue. The proportion of each ecological system to be treated is different because of their distribution on the landscape.

Basin wildrye – big sagebrush:

Treatment would be at 90% of the Proposed Action. Effects would be expected to be similar to the Proposed Action. There would be a reduction in Ecological Departure compared to No Action over 20 years and a larger more amount if continued over 50 years. High Risk Classes would also be greatly reduced.

Low sagebrush:
Treatment would be at 53% of the Proposed Action. The Ecological Departure would be expected to be reduced by wildfire activity only. Even treatment at the Proposed Action levels is not enough to reduce the Ecological Departure measurably. Over the 20 year timeframe treatment of only 53% of the system also not likely to reduce High Risk vegetation classes. It may start to have an effect over a 50 year time frame.

Montane sagebrush steppe:
Treatment would be at 73% of the Proposed Action. A small reduction in Ecological Departure would be expected. High Risk Vegetation Classes would not be reduced over a 20 year time frame but might show a small reduction after 50 years at this treatment level.

Mountain shrub:
Treatment would be at 100% of Proposed Action so effects would be expected to be the same. None of the alternatives are expected to reduce Ecological Departure or High Risk Classes.

Wyoming sagebrush – loamy:
Treatment would be at 96% of the Proposed Action, so the effects are expected to be essentially the same as the Proposed Action, no reduction in Ecological Departure and a small reduction in High Risk Classes.

Wyoming sagebrush – sandy:
Treatment would be 100% of the Proposed Action, so effects would be the same. None of the alternatives are expected to be able to reduce Ecological Departure. High Risk Vegetation Classes would be reduced slowly over time compared to No Action.

Montane riparian:
Treatment would be at 93% of the Proposed Action so the effects are expected to be essentially the same as to the Proposed Action, reducing both Ecological Departure and High Risk Classes.

Stable aspen:
Treatment would be at 75% of the Proposed Action. Ecological Departure would not be likely to be reduced at this treatment level unless treatments were continued for 50 years. High Risk Classes would be reduced compared to No Action.

Wet meadow:
Treatment would be 100% of the Proposed Action, so effects would be the same. Ecological Departure would not be reduced unless continued for 50 years. High Risk Classes would likely be reduced compared to No Action.

Acres of Key Classes Created:
The Limited Treatment in WSAs Alternative would create few acres of key classes in the Bodie Hills landscape than the Proposed Action in most ecological systems. It would increase the amount of early seral from 68% to 135% in shrubland ecological systems, and create a total of 2895 acres of open shrubland habitats in areas currently converted to trees (see Table 18).

**Table 18.** Acres of underrepresented early seral classes (A and B) created by the Limited Treatment in WSAs Alternative and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 5: Limited Treatment in WSAs** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 210 | 84% | 260 | 105 | 40% |
| Low sagebrush | 629 | 425 | 68% | 5458 | 665 | 12% |
| Montane sagebrush steppe | 8132 | 7130 | 88% | 38607 | 550 | 1% |
| Mountain shrub | 742 | 1000 | 135% | 687 | 0 | 0% |
| Wyoming sagebrush - loamy | 0 | 240 | undefined | 1662* | 575* | 35%* |
| Wyoming sagebrush - sandy | 0 | 500 | undefined | 213* | 1000* | 469%* |
| Montane riparian | 55 | 28 | 51% | 0 | 0 | NA |
| Stable aspen | 524 | 375 | 72% | 1432 | 375 | 26% |
| Wet Meadow | 1219 | 100 | 8% | 0 | 0 | NA |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative Effects*

The cumulative effects of the Limited Treatment in WSA Alternative are predicted to be similar to the Proposed Action (see above). The only action that would have cumulative effects when combined with this alternative would be the vegetation treatments being implemented and planned on private lands. These would slightly increase the reduction of Ecological Departure mostly in riparian systems.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

The No Treatment in WSAs Alternative reduces the amount of treatment to 67% of the Proposed Action. This Alternative was not modeled in Provencher, Low et al. so the effects must be estimated by comparison to the Proposed Action which shows the effects outside of the WSAs and the No Action Alternative which shows the effects no treatment in the WSAs (2009). Overall, the effects would be expected to be intermediate between the No Action and the Proposed Action on the graphs in Figure 7, Figure 8, and Figure 9 in the summary at the end of the analysis of this issue. The proportion of each ecological system to be treated is different because of their distribution on the landscape.

Basin wildrye – big sagebrush:

Treatment would be at 87% of the Proposed Action. Much of the basin wildrye-big sagebrush ecological system lies outside the WSAs, so effects would be expected to be similar to the Proposed Action. There would be a reduction in Ecological Departure compared to No Action

over 20 years and a larger more amount if continued over 50 years. High Risk Classes would also be greatly reduced.

Low sagebrush:
Treatment would be at 51% of the Proposed Action. The Ecological Departure would be expected to be reduced by wildfire activity only. Even treatment at the Proposed Action levels is not enough to reduce the Ecological Departure measurably. Over the 20 year timeframe treatment of only 51% of the system also not likely to reduce High Risk vegetation classes. It may start to have an effect over a 50 year time frame.

Montane sagebrush steppe:
Treatment would be at 60% of the Proposed Action. A small reduction in Ecological Departure would be expected. High Risk Vegetation Classes would not be reduced over a 20 year time frame but might show a small reduction after 50 years at this treatment level.

Mountain shrub:
Treatment would be at 93% of Proposed Action so effects would be expected to be very similar to the Proposed Action. None of the alternatives are expected to reduce Ecological Departure or High Risk Classes.

Wyoming sagebrush – loamy:
Treatment would be at 96% of the Proposed Action, so the effects are expected to be essentially the same as the Proposed Action, no reduction in Ecological Departure and a small reduction in High Risk Classes.

Wyoming sagebrush – sandy:
Treatment would be 100% of the Proposed Action, so effects would be the same as the Proposed Action. None of the alternatives are expected to be able to reduce Ecological Departure. High Risk Vegetation Classes would be reduced slowly over time compared to No Action.

Montane riparian:
Treatment would be at 87% of the Proposed Action so the effects are expected to be similar to the Proposed Action with slightly reduced effectiveness at reducing both Ecological Departure and High Risk Classes.

Stable aspen:
Treatment would be at 54% of the Proposed Action. Ecological Departure would not be likely to be reduced at this treatment level unless treatments were continued for 50 years. High Risk Classes could be slightly reduced compared to No Action.

Wet meadow:
Treatment would be 72% of the Proposed Action, so effectiveness would be reduced. Ecological Departure would not be reduced unless continued for 50 years. High Risk Classes would likely be reduced compared to No Action.

Acres of Key Classes:
The No Treatment in WSAs Alternative would create few acres of key classes in the Bodie Hills landscape than the Proposed Action in most ecological systems. It would increase the amount of early seral from 64% to 125% in shrubland ecological systems, and create a total of 2770 acres of open shrubland habitats in areas currently converted to trees (see Table 19).

**Table 19.** Acres of underrepresented early seral classes (A and B) created by the No Treatment in WSAs Alternative and overrepresented acres of tree expansion removed. Current and total acres are for the entire project area on all ownerships as mapped in 2007. Mapping of tree expansion is difficult until the trees are well emerged from the shrub layer so the current acreages are only estimates.

| **Alt. 6: No Treatment in WSAs** | | | | | | |
|---|---|---|---|---|---|---|
| **Ecological System** | **Acres of early seral classes** | | | **Acres of tree expansion** | | |
| | **Current** | **Acres created** | **Percent increase** | **Current** | **Acres removed** | **Percent decrease** |
| Basin wildrye-big sagebrush | 250 | 200 | 80% | 260 | 105 | 40% |
| Low sagebrush | 629 | 400 | 64% | 5458 | 640 | 12% |
| Montane sagebrush steppe | 8132 | 5880 | 72% | 38607 | 450 | 1% |
| Mountain shrub | 742 | 930 | 125% | 687 | 0 | 0% |
| Wyoming sagebrush - loamy | 0 | 240 | undefined | 1662* | 575* | 35%* |
| Wyoming sagebrush - sandy | 0 | 500 | undefined | 213* | 1000* | 469%* |
| Montane riparian | 55 | 26 | 47% | 0 | 0 | NA |
| Stable aspen | 524 | 270 | 52% | 1432 | 270 | 19% |
| Wet Meadow | 1219 | 72 | 6% | 0 | 0 | NA |

* Mapping of tree expansion in Wyoming sagebrush was inaccurate because early stages are impossible to detect before trees are taller than the shrub layer. Based on experience in the Bodie Hills and data from across the Great Basin, there are currently more acres of early stage tree expansion in close proximity to current pinyon and juniper stands. Model runs predict 600 acres of tree expansion in Wyoming – loamy and 5670 acres in Wyoming – sandy within 20 to 50 years.

*Cumulative Effects*

The cumulative effects of the No Treatment in WSAs Alternative are predicted to be similar to the Proposed Action (see above). The only action that would have cumulative effects when combined with this Alternative would be the vegetation treatments being implemented and planned on private lands. These would slightly increase the reduction of Ecological Departure mostly in riparian systems.

*Summary of All Alternatives*

Ecological Departure is expected to decline slightly in most systems under all the Alternatives if wildfire activity increases as expected. The reduction is similar across all alternatives for several of the systems. It is greater under Alternative 2 for Basin wildrye – big sagebrush, Montane sagebrush steppe, montane riparian, and stable aspen. Even greater reductions are achieved in Alternative 3 for Wyoming sagebrush – loamy and potentially Montane sagebrush steppe. Alternatives that resulted in larger reductions in Ecological Departure were precluded because of limits in the Resource Management Plan and the cost and effort that would be involved (see the Alternatives developed but not analyzed in detail).

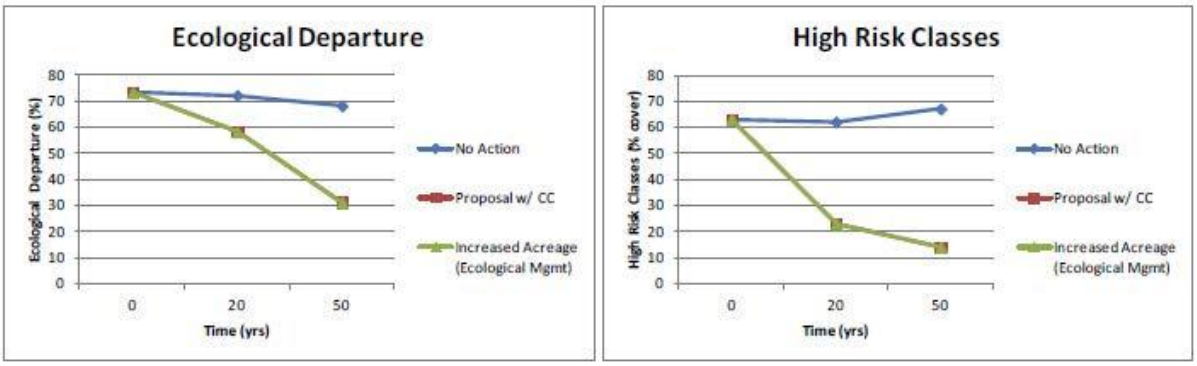
Because large changes in Ecological Departure are not feasible with the current constraints, other measures can be more informative. The proportion of vegetation in High Risk classes is important to the risk that large shifts and undesirable changes in the ecological system may occur. Increases in High Risk vegetation are expected in 4 out of the 9 ecological systems if no action is taken. Three systems are not expected to have any change in High Risk vegetation. The remaining 3 systems are expected to experience declines in High Risk vegetation due to likely increases in wildfire activity.

The Proposed Action reduces the amount of expected High Risk vegetation for 8 out of the 9 target ecological systems. Alternative 3 would be expected to achieve even greater reductions in the proportion of High Risk vegetation in 2 of the systems, Montane sagebrush steppe and Wyoming sagebrush – loamy.

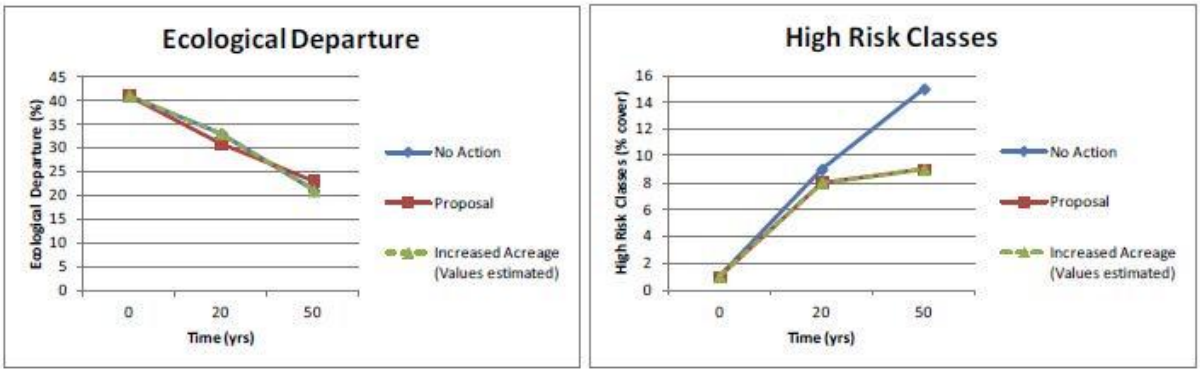
Another measure of the effects of the treatments is the acres of key seral classes created on the landscape. The Proposed Action would double the amount of currently underrepresented early seral classes in shrubland habitats. These early seral classes are important to wildlife and fire behavior (see Issues 5, 12 and 13). When compared to the Proposed Action, the Increased Acreage Alternative would create more early seral acres in two ecological systems, whereas, under Alternatives 4-6 the amount of early seral stages created would be less in most ecological systems. The Proposed Action would also remove 3,720 acres of expanding trees from shrubland habitats. These acres are also important to wildlife and fire behavior (See Issues 5, 12 and 13). Alternative 3 would increase this amount slightly, and it would be reduced under Alternatives 4-6.

The results for Ecological Departure and High Risk Classes are summarized in the graphs that follow.

**Basin wildrye – big sagebrush**




**Low sagebrush**




**Montane sagebrush steppe**

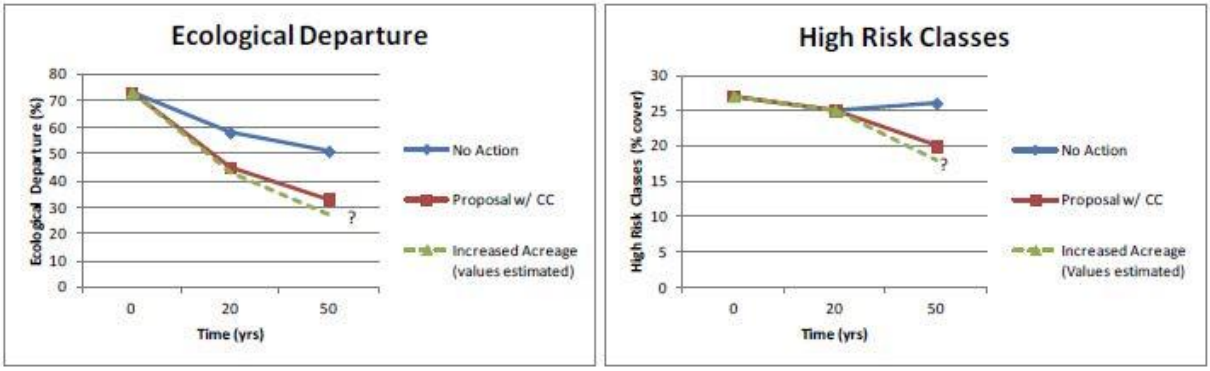
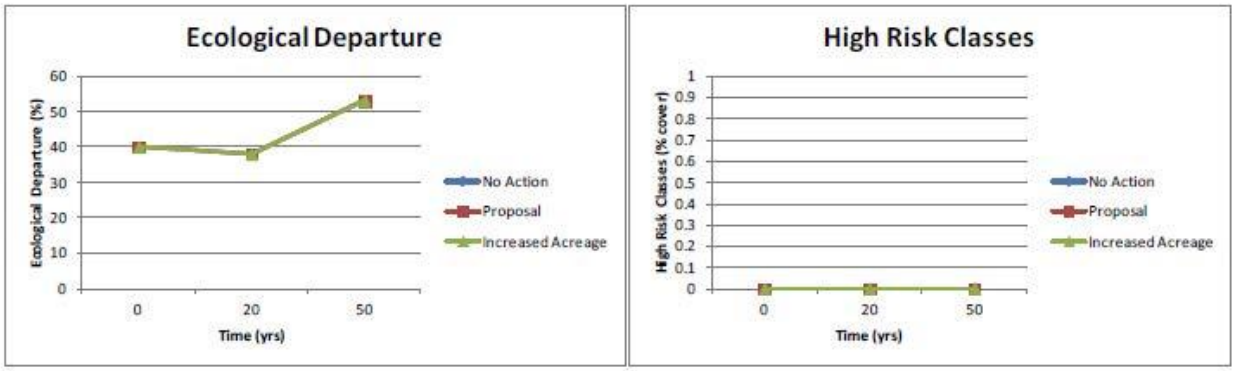
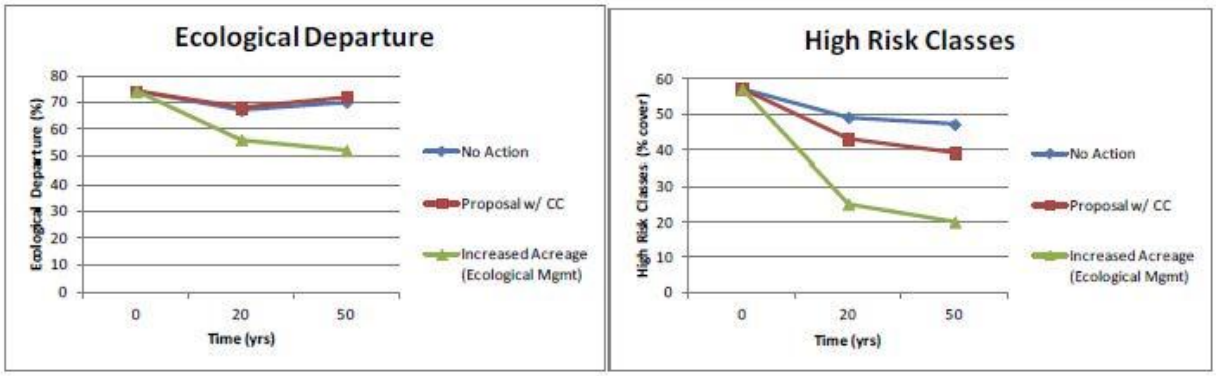



**Figure 7.** Graphs showing Ecological Departure and High Risk Classes: First set of Upland Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher, Low et al. 2009 report. Scenarios in the report are similar to Alternatives 1-3. Alternatives 4-6 would be intermediate between No Action and the Proposed Action.

**Mountain Shrub**




**Wyoming sagebrush – loamy**




**Wyoming sagebrush – sandy**

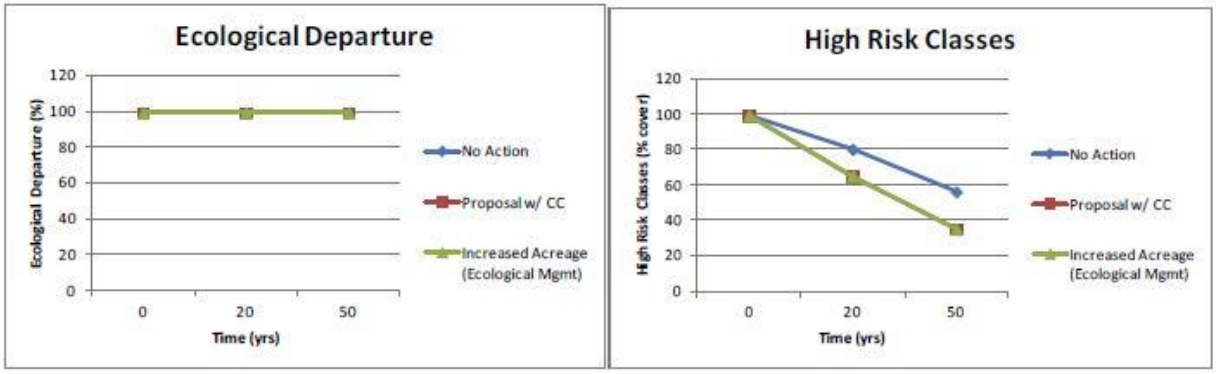
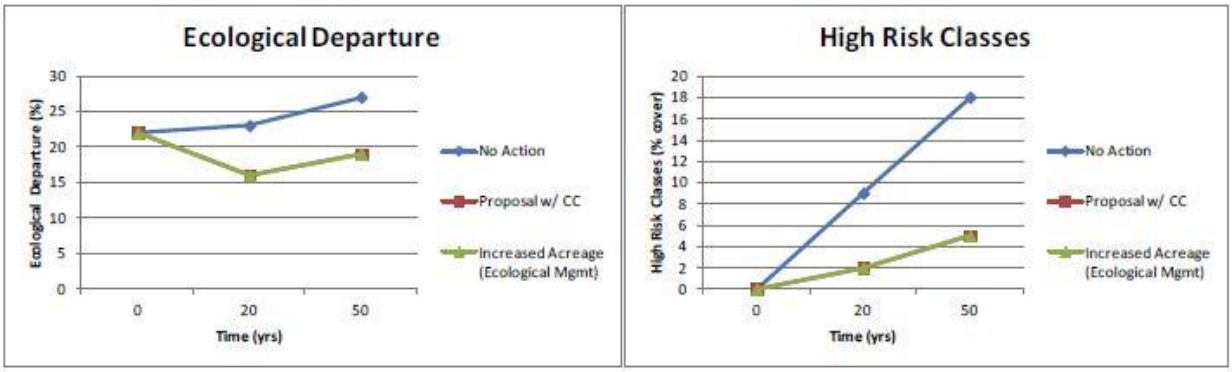


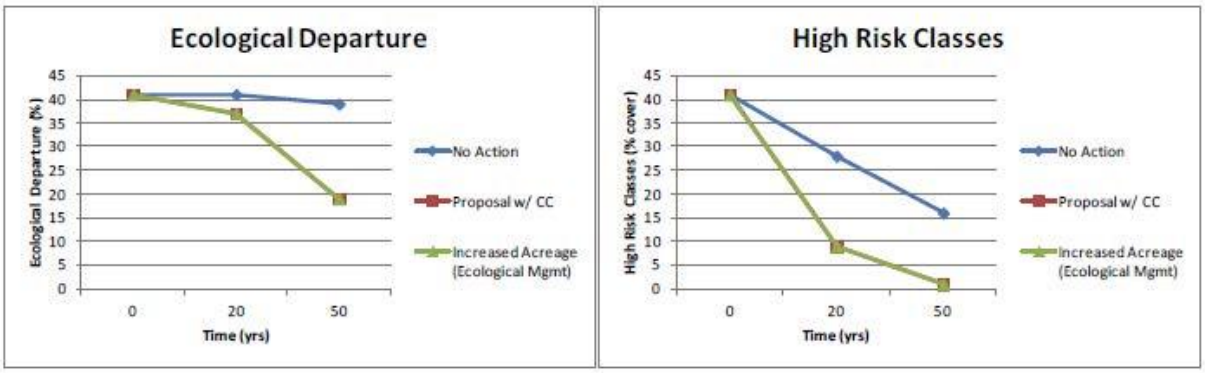

**Figure 8.** Graphs of Ecological Departure and High Risk Classes: Second set of Upland Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher, Low et al. 2009 report. Scenarios in the report are similar to Alternatives 1-3 . Alternatives 4-6 would be intermediate between No Action and the Proposed Action.

**Riparian types**

**Montane riparian**




**Stable aspen**




**Wet meadow**

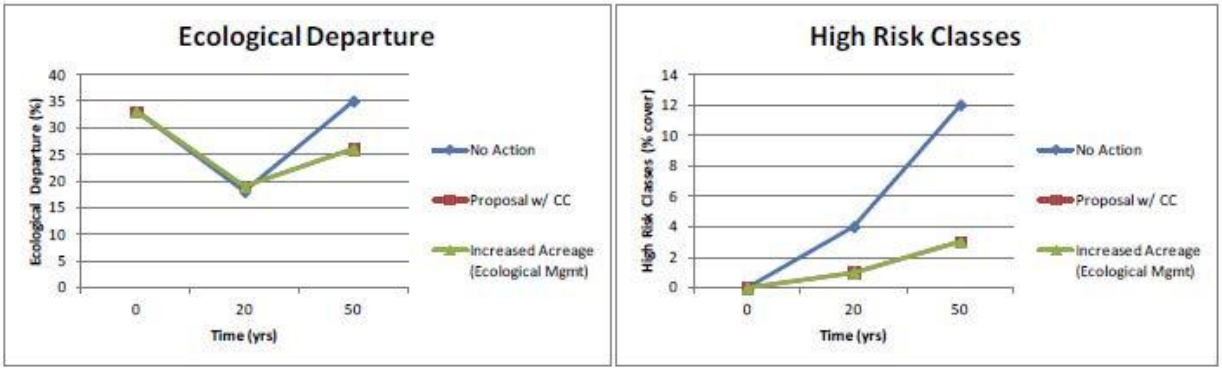



**Figure 9.** Graphs of Ecological Departure and High Risk Classes: Riparian Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher, Low et al. 2009 report. Scenarios in the report are similar to Alternatives 1-3 . Alternatives 4-6 would be intermediate between No Action and the Proposed Action.

## Fragmentation:

***4. Will the treatments lead to increased fragmentation of ecosystems in the Bodie Hills?***

*Background*

In the dictionary sense, fragmentation is the breaking up of something into smaller pieces. In ecology, fragmentation is difficult to define because it depends on the frame of reference and the purpose of the use of the term. The landscape characteristic that is being fragmented and the scale must be defined (Franklin, Noon et al. 2002). It is typically used to describe a negative effect to habitat, but in its landscape ecology context it could be used to describe the physical characteristics of an ecosystem or habitat in its natural state without alteration. Fragmentation is different from habitat or ecosystem heterogeneity where variation is part of the whole. For the purpose of this analysis there are three different types of fragmentation that could be described:

1. Typically fragmentation is used broadly to talk about the fragmentation of intact ecosystems by conversion of portions to a different cover type due to human activities. Examples are conversion to agriculture or development.
2. The definition of fragmentation that has the most biological meaning is based on habitat and the needs of a specific species. It has to be defined for that species by their tolerance for specific habitat attributes in the environment such as structure or composition (Hobbs 1998, Franklin, Noon et al. 2002).
3. Fragmentation can also be used as a descriptive metric of the special arrangement of an intact ecological system or habitat. An ecological system like low sage which naturally occurs in small separate patches where there are shallow soils in the Bodie Hills would be described as highly fragmented. An ecological system like montane sagebrush steppe that occurs in the Bodie Hills in vast swaths and makes up the primary ecological system would be described as having low fragmentation.

This analysis will discuss effects in terms of the first definition as fragmentation of ecological systems and effects in terms of the second definition as fragmentation of habitat. Every species has slightly different requirements so it is impossible to analyze for every species habitat. Some species require a lot of heterogeneity in the landscape. Others require a very narrowly defined habitat. In order to provide for all a variety of ecological conditions are required. Since this project mostly targets upland shrubland habitats the primary species used will be sage steppe dependent species with greater sage-grouse as an example. Effects to woodland dependent species are discussed in Issues 13 and 16. The third definition is not affected by the project alternatives since it is a property of the ecosystems that will not be changed by the treatments.

The current condition of ecological systems of the Bodie Hills is relatively unfragmented in the sense of not being converted to other land cover types for human use. There are a network of roads and routes through the Bodie Hills which may provide barriers to some species. There are a few developments including Bodie State Park and some private inholdings but these are a very small part of the area. Land management practices have maintained native ecological systems. There are areas where invasive annual grasses threaten to convert the vegetation to uncharacteristic grassland, but there is still a native component to all these sites.

From the perspective of habitat for individual shrub steppe dependent species, the largest vegetation change which fragments their habitat is the expansion of pinyon and juniper. Pre-

settlement the pinyon and juniper woodlands occurred in small patches scattered throughout a mid-elevation band in the Bodie Hills. Expansion of pinyon and juniper into shrubland sites is breaking up those habitats and separating high elevation shrublands from lower elevations.

*Alternative 1: No Action*

*Direct and Indirect Effects*

The No Action Alternative will not lead to any fragmentation of the ecological systems of the Bodie Hills due to treatments since none will be implemented. However, large severe fires could likely lead to a conversion from sagebrush steppe to non-native annual grassland (see Issue #1, 5, and 8). This would result in fragmentation of those ecological systems. The degree of fragmentation will depend on the amount, severity and size of the fires. If the fires are very large the impacts to species may be more from habitat loss than fragmentation (Franklin, Noon et al. 2002). The amount of fragmentation that occurs in the 10 year period of this project may be small, but it may set the stage for greater losses due to fire and cheatgrass in the next 50 years as modeled in the TNC report (See Issues #1 and 5).

Pinyon and juniper expansion into shrubland habitats would persist and continue to affect new sites except where it is set back by large fires. This continued pinyon and juniper expansion would fragment the shrubland habitats of sage steppe dependent species. Larger patches of juniper and pinyon create a greater distance between suitable shrubland patches. This can result in either decreased ability for animals to disperse between suitable patches or higher metabolic costs to travel between suitable patches. Decrease in dispersal ability can lead to loss of genetic diversity and the increased metabolic costs could result in decreased survival or reproductive success.

*Cumulative Effects*

The other major past, present and future land management actions have been incorporated into the analysis of the trajectory of the ecological systems under the No Action Alternative so they are not considered as cumulative effects (See analysis at Issue #1). There is the potential for development or cover type conversion on the private inholdings within the project area, but there are no specific reasonably foreseeable development projects at this time.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The treatments themselves will not lead to fragmentation of the target ecological systems because they do not convert the ecological system to uncharacteristic states. The treatments will create patches of different seral stages. A heterogeneous mosaic of different seral stages is the natural condition for these ecological systems. Many sagebrush steppe dependent species use multiple seral stages for different parts of their life cycle or for different needs. For example, sage-grouse depend on dense older sagebrush stands for nesting and winter habitat, but also require the earlier stages with abundant forbs and grasses for a food source when rearing their chicks. Research on treatments in sagebrush steppe similar to those proposed here has found that there can be local negative effects on habitat of certain species due to the treatments, but there is a potential for a much larger negative effect due to large fires and pinyon-juniper expansion (Noson, Schmitz et al. 2006).

The treatments are designed to help prevent conversion to uncharacteristic states which has the potential to fragment the ecological systems of the Bodie Hills. The TNC analysis mapped vegetation classes that are at risk of conversion. The predictions from that analysis were that those high risk vegetation classes would increase in a majority of ecological systems (see Issue #1). The treatments should reduce the risk of large severe fires that could convert to non-native annual grasslands and increase the reliance of the ecological systems to further invasion by non-native annual grasses (See issue #5). The treatments also help to slow the increases in pinyon and juniper in shrub ecological systems which have been fragmenting habitat for sage steppe dependent species. The treatments will not affect true pinyon woodland so habitat will remain for woodland associated species. See the analysis of Issues #1, 5, 8 and 12 for more detail on the ecological effects of the Proposed Action.

The Proposed Action is predicted to reduce the potential for fragmentation of the ecological systems and the habitats of shrub steppe dependent species of the Bodie Hills or at least slow the increase in fragmentation due to conversion to non-native annual grasslands and woodlands.

*Cumulative Effects*

The cumulative effects of the Proposed Action with other actions in the Bodie Hills landscape are the same as those of the primary ecological dynamics affecting the ecological systems of the Bodie Hills, the ecological departure, fire regime, and wildlife and plant species that depend on those systems. See the cumulative effects analysis for Issues #1, 5, 8 and 12. The only expected cumulative effect is with similar treatments on private lands which will add slightly to the effect of the treatments at a landscape scale to increase the ecological resilience of the systems to large disturbances that would fragment them.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The effects of the Increased Acreage Alternative are expected to be similar to the Proposed Action. Analysis of the effects to the Ecological Departure and fire regime found that the Increased Acreage Alternative was a little more likely to slow or prevent increases in uncharacteristic fires, cheatgrass conversion, and pinyon-juniper expansion. The Increased Acreage Alternative would be expected to have the same or slightly better effects on fragmentation.

*Cumulative Effects*

The cumulative effects are expected to be the same as the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The CWPP WUI Alternative would have effects similar to the Proposed Action within the CWPP WUI and similar to the No Action Alternative in the area outside the WUI. Fragmentation could increase outside the WUI due to the effects of large fires, cheatgrass and pinyon-juniper expansion. In the WUI fragmentation would be expected to be controlled to some extent by the treatments. At a landscape scale for the entire Bodie Hills, the effects of the CWPP WUI Alternative would be intermediate between the No Action and Proposed Action.

*Cumulative Effects*

The cumulative effects would be the same as the Proposed Action in the WUI and the same as the No Action outside it. Together there would be a small addition of the effects of private lands treatments in the WUI and no cumulative effects outside it to mitigate potential increases in fragmentation.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

The Limited Treatment in WSAs Alternative would have effects similar to the Proposed Action but with reduced effectiveness at preventing fragmentation in the WSAs.

*Cumulative Effects*

The cumulative effects would be similar to the Proposed Action with a lower combined effectiveness at preventing potential conversions in the WSAs.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

The No Treatment in WSAs Alternative would have similar effects to the Proposed Action outside the WSAs and similar to the No Action Alternative in the WSAs. Together this means that this alternative would be less effective over the entire landscape than the Proposed Action. It would not be expected to prevent fragmentation by large wildfires and vegetation conversion as effectively both in the WSAs where there would be no treatment, but also outside because of the lack of a landscape wide effect on the fire regime to help prevent fragmentation by large wildfires (see Issue #5).

*Cumulative Effects*

The cumulative effects would be similar to the Proposed Action except there would be a lower combined effectiveness at preventing potential conversions because of the lack of treatment in the WSAs.

## Fire Regime:

***5. What will the effect of the treatments be on the fire regime?***

*Background*

The ecological systems of the Bodie Hills have a variety of fire regimes and fire return intervals. Fire regimes under a natural range of variability can be hard to estimate in shrub systems because the fire regimes involve replacement and there are no long term records such as fire scars on large trees in forests with a low severity fire regime. Estimates are based on research using fire scars on trees in adjacent forests at the ecotone between forests and shrublands, demography, modeling, and charred woody debris (Miller and Tausch 2001, Bauer and Weisberg 2009). The following table describes the fire regime under a natural range of variability for each of the target ecological systems according to the best available information. These estimates were used in the modeling for the analysis in the TNC report and are documented in the biophysical setting models in Provencher, Low et al. 2009.

**Table 20.** Estimated natural fire return intervals for the key ecological systems of the Bodie Hills. Values are based on the review of available scientific information and professional option gathered at the TNC workshops. See Provencher, Low et al. 2009 for literature review and description of each system.

| Ecological system | Fire regime | Estimated fire return interval (FRI) | Notes |
|---|---|---|---|
| Basin big sagebrush/basin wildrye | Replacement | 40-67 years | Uncertainty due to limited studies focused on this system |
| Low sagebrush | Replacement in small patches | 250 years | Drought and insect outbreak events are also important disturbance regimes |
| Montane sagebrush steppe | Replacement | 40-80 years | Debate on fire return intervals, insect outbreaks also play a role as a disturbance agent |
| Mountain shrub | Replacement | 50-100 years | Dependent on the adjacent ecological system |
| Wyoming sagebrush - loamy | Replacement | 100 years | |
| Wyoming sagebrush - sandy | Replacement | 100 years | |
| Montane riparian | Replacement | 50- 88 years | Flooding, scouring and deposition are primary disturbance regimes. |
| Seral aspen | Mixed severity | 20-60 years | Fire dependent system. FRI depends on degree of conifer encroachment. |
| Wet meadow | Replacement | 40 years | Depends on adjacent ecological system. |
| Pinyon Woodland (Not a target ecological system. No treatments in true pinyon woodland are proposed) | Replacement with possible rare low severity under burns | 200 years | This is not a target ecological system, but is included to inform the analysis and show how fire regime changes when shrub sites get converted to Pinyon-juniper stands. |

As described in the *Background* section of Chapter 1, altered fire regimes are one of the primary factors causing ecological degradation of sagebrush ecological systems across western North America. Where fire return intervals have been lengthened by fire suppression and land use that removes fine fuels such as inappropriate grazing, shrub ecological systems are being converted to pinyon-juniper stands. At lower elevations where fire frequencies have been increased by the introduction of non-native annual grasses and development that results in more fire starts, the systems are rapidly being converted to non-native annual grasslands (Miller and Tausch 2001; Wisdom and Chambers 2009;Davies, Boyd et al. 2011b).

Fire return intervals as calculated from the BLM's fire records are far longer than the estimated natural fire return intervals of the ecological systems in the project area. Accurate records are available from 1984 to 2011. In that 27 year period there were 139 fires recorded (an average of 5 fires per year), with 115 (83%) of the fires determined to have been ignited by lightning. The total acres burned were recorded at 1668 acres (an average of 61.8 acres per year), with 1636 acres (98%) attributed to the lightning-caused fires. The Bishop RMP directs that wildfire suppression strategies in the Bodie Hills target a maximum fire size of 1 acre with a 90% success rate (USDI BLM 1993a). In the 1984 to 2011 dataset, the BLM has kept 83% of the wildfires from all ignition sources at 1 acre or less and 84% of the lightning-ignited wildfires at 1 acre or less. Fire suppression activities were initiated on all 139 reported fires and no information or estimates of potential fire size without suppression efforts exist.

Averaged over the entire area and multiple ecological systems, this is a fire return interval of about 3,300 years, more than an order of magnitude longer than any of the estimated natural fire-return intervals except for alpine areas. The data for this 27 year period is the best available, but several other datasets and time periods were also used to calculate the actual fire return interval under current management and they were all in the same order of magnitude. Calculations integrating multiple ecological systems are very coarse, but the long fire return interval demonstrates that there has been very little fire in the Bodie Hills compared to what we think the natural fire return intervals would be. This helps to explain the ecological departure of most of the ecological systems (see Issue #1).

*Alternative 1: No Action*

*Direct and Indirect Effects*

The ecological systems of the Bodie Hills are departed and dominated by uniform late developmental classes with high fuel loads (Provencher, Low et al. 2009). Under the No Action Alternative, this condition will continue and increase except when disturbances such as wildfire and insect outbreaks move blocks of vegetation to earlier developmental classes. Because of this uniform fuel loading across the landscape with a high percentage of dead to live material, it is likely that wildfire size, intensity and frequency may increase. Current trends already show this effect, and models of future climate and fire dynamics also indicate that increasing fire activity is likely.

Increasing burned area as a result of wildfire has been documented across the western US especially since 1980 (Stephens 2005; Westerling, Hidalgo et al. 2006; Littell, McKenzie et al. 2009). This trend is also true at the local ecoregional scale where not only increasing area burned but also increasing fire severity has been documented (Littell, McKenzie et al. 2009; Miller, Safford et al. 2009).

The TNC analysis modeled the outcome of management scenarios for the Bodie Hills by sampling fire histories from several neighboring landscapes with similar characteristics to the Bodie Hills. These fire histories were used to create fire events during the modeled time periods. These neighboring landscapes; Topaz Lake-Walker-Sweetwater Range area, the southern Wassuk Range immediately adjacent to the Bodie Hills in Nevada, the Glass Mountains south of Mono Lake, and the northern White Mountains (Benton-Boundary Peak area) all have more area burned from 1980 to 2006 than the Bodie Hills. This indicates that increases in burned area in the Bodie Hills are very likely as well.

Climate change models predict further increases in fire area and severity over the next 30 years and beyond (Westerling, Bryant et al. 2011). The increases in the size and severity of fires already observed in the region are consistent with these modeling results suggesting that climate change is already affecting local fire regimes (Westerling, Hidalgo et al. 2006; Miller, Safford et al. 2009; Mallek and Safford 2011; Westerling, Bryant et al. 2011).

Throughout the region the introduction of cheatgrass, an introduced annual grass, has been changing the fire regime (D'Antonio and Vitousek 1992; Keane, Agee et al. 2008). Great Basin ecological systems typically have large spaces between individual plants. The primary grass

species native to these systems are perennial bunch grasses that occur as clumped discrete individuals. The introduction of a non-native annual grass species that fills in the spaces between the individuals with very flashy fuels that are cured very early in the season allow fires to spread much more extensively than in the past. Cheatgrass and other non-native annual grasses also respond positively to fire and compete very aggressively with the native species after a fire. These unique ecological traits result in a completely different fire regime with more frequent and larger fires. This effect has been observed locally in several areas. The fires in the Antelope and Little Antelope Valleys north of the Bodie Hills have been larger and more frequent than historical fire regimes. Cheatgrass has invaded most of the fire areas and facilitates frequent re-burning. For example the 2004 Dana Fire reburned a portion of the 2002 Slinkard Fire. This would not have been expected to re-burn so soon without cheatgrass. The John Fire in 2011 burned under much higher fuel moisture conditions than would have been expected and spread within hours to consume the entire area around Crater Mountain which is primarily lava and cinder substrate. The Bodie Hills have not yet experienced a level of cheatgrass that facilitates this increased fire behavior, but cheatgrass occurrence has been increasing and expanding in recent years and will likely cause these effects in the near future.

All of these lines of evidence together; the ecological departure of the Bodie Hills ecological systems, the greater size, severity and frequency of fire in adjacent landscapes, regional upward fire trends, predictions of change in fire regimes with ongoing climate change, and increasing occurrence of cheatgrass make increasing wildfire, in terms of greater area and severity, in the Bodie Hills under the No Action Alternative very likely.

Increasing fire frequency would be beneficial for the ecological systems of the Bodie Hills if it moved them closer to their natural fire regime; however, the severity and size of fires is also expected to increase. Large severe fires would not be beneficial for the ecological systems of the Bodie Hills or for the wildlife and human communities that depend on them. Large severe fires were not part of the natural fire regime because of the discontinuous fuels and the short duration of extreme fire weather events. Sagebrush ecological systems typically recover very slowly from large fires because the shrubs have to be reestablished by seed and the seed does not travel very far from the parent shrub (Welch and Criddle 2003; Davies, Boyd et al. 2011b). Cheatgrass conversion is more likely after high severity fires (Davies, Boyd et al. 2011b). Large severe fires outside the natural range of variability may also have negative effects to the soil and watershed processes. These effects to the vegetation, wildlife, watershed, and cultural resources would be expected under the No Action Alternative with increasing fire size and severity are described in more detail in Issues #1, 4, 8, 12, and 15 and the Cultural Resources Section in Chapter 3 of this EA.

*Cumulative Effects*

The cumulative effects analysis area for fire regimes is the greater Bodie Hills landscape, the same as the area defined for cumulative effects at Issue 1. The time scale is the same as that for the direct and indirect effects, from the 10 year period of the Proposed Action to the modeling horizon for the TNC analysis up to 50 years in the future. The cumulative effects are also similar to Issue 1. The major past impacts and future expected changes are part of the No Action Alternative and not analyzed as cumulative effects. The only action that has a potential cumulative effect is the vegetation treatments planned or recently implemented on private lands

within the analysis area. These private land treatments may locally moderate fire behavior, but will not be expected to have an effect on the overall fire regime in the Bodie Hills. Therefore, at a landscape scale there is no cumulative effect but there may be a small beneficial cumulative effect on the adjacent BLM lands in the area of the treatments to help prevent the expected increases in fire size, frequency and severity.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

Many landscapes across North America have fuel conditions that are outside the Natural Range of Variability due to fire suppression. As land managers are looking for ways to reintroduce fire and to reduce some of the fuel loads due to fire suppression, there has been considerable recent science devoted to how to strategically implement a program of fuel reduction across the landscape enough to moderate expected fire behavior and fire regimes. Using modeling with vegetation data from three different real landscapes from across the west, Finney et al found that treatment of 1%-2% of the landscape per year can reduce fire spread rate, burn probability and fire sizes if treatments are optimally arranged to prevent fire spread perpendicular to the most likely fire spread paths. If treatments are arranged randomly then about twice as much treatment is required. Treatment at these rates for 10 years showed a large effect. Continued gains were made at a slightly slower rate if the treatments were continued for 20 years and after that there was no additional benefit from continued treatment. Similarly a large effect was observed for treatment rates of 1% of the landscape, additional gains were possible with greater treatment rates but a rate of more than 2% of the landscape did not provide any additional benefits. The authors also noted that the treatment methods did not affect the outcome; the treatment rate across the landscape was much more important (Finney, Selia et al. 2007).

The Proposed Action involves treatment of 10% of the BLM managed lands over a decade or an average of about 1% a year. If these treatments are optimally arranged this should reduce the fire size and intensity according to the Finney et al study. The treatments will be strategically placed, but will not be placed with only fire size reduction as a priority. It would be expected that the results for the Proposed Action would be somewhat intermediate between the optimal and random scenario. Some reduction in fire size and severity would be expected, but greater treatment rates could reduce it further.

Other studies have found similar results. Syphard et al. found that a treatment rate of 8% of the landscape in 5 years (1.6%) was enough to lengthen the fire cycle in the western Sierra Nevada, but greater treatment rates increased the effectiveness (Syphard, Scheller et al. 2011).
Both of these modeling studies used primarily forested landscapes with a small portion of shrublands. There are no comparable studies in Great Basin ecosystems, so these studies are the best available information and have to be extrapolated to the Great Basin systems.

The Proposed Action would be expected to moderate the fire regimes in the project area so that fire size and severity were closer to the natural range. There may still be increases in fire frequency, size and severity as predicted for the No Action Alternative, but the treatments would be expected to moderate this increase and keep fire characteristics closer to the Natural Range of Variability.

Once the treatments are implemented, natural fires would be expected to pose less risk to natural ecosystems in terms of loss of sage-grouse habitat and conversion to cheatgrass and to cultural resources. They would also pose less risk to nearby developments and communities. It is possible that natural fires could then be more effectively managed for resource benefit to help restore the natural fire regime. However, this will require amendment or revision of the Fire Management Plan which currently does not allow for management of fires for resources benefit because of the high risks.

*Cumulative Effects*

As described in the cumulative effects analysis of the No Action Alternative above, most of the land management activities in the analysis area are already accounted for in the effects of the No Action Alternative and are therefore not considered as cumulative effects. Similar treatments on private lands will have a small beneficial cumulative effect and should be expected to help achieve the 1% treatment rate of the entire landscape necessary to affect the size and intensity of fires. The treatment rate analyzed in the direct and indirect effects was for BLM managed lands only, but because private land owners are also planning treatments, the 1% treatment rate should also be achieved across the entire multi-ownership landscape.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The Increased Acreage Alternative involves treatment of 14% of the landscape over 10 years or an approximate 1.4% per year treatment rate. As described above in the analysis of the Proposed Action, the Finney, Selia et al. study found that treatment rates of 1% per year were adequate to affect the behavior of fires on a landscape scale if the treatments were optimally located but if they were randomly located a rate of 2% was necessary (2007). The treatments in this project will be strategically located to achieve multiple goals so they will probably be somewhere in between the optimal and random scenarios in the Finney et al. study (Finney, Selia et al. 2007;Syphard, Scheller et al. 2011). The rate found to be necessary in a similar study was 1.6% consistent with this assumption (Syphard, Scheller et al. 2011). The treatment rate under the Increased Acreage Alternative would be more likely to have a landscape wide effect on the behavior of fire than the Proposed Action because it elevates the level of treatment above 1%. The Increased Acreage Alternative would have the best chance of any of the alternatives to counteract the current and predicted trends for larger and more severe fires in the Bodie Hills outside the natural range of variability for the ecological systems. The impacts of preventing increases in severe fire behavior on the vegetation, wildlife, watershed, cultural, and wilderness resources in the Bodie Hills are described in Issues #1, 4, 8, 12, 15, 20, and 21 and the Cultural Resources section in Chapter 3 of this EA).

*Cumulative Effects*

The cumulative effects for the Increased Acreage Alternative are the same as the Proposed Action. Only private lands treatments would have a cumulative effect and it would be a small beneficial one increasing the likelihood that the treatments would have a landscape effect on fire behavior.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The CWPP WUI Alternative involves treatment only within a reduced area. Treatments would be implemented in an area equal to 61% of the BLM managed lands in the Bodie Hills. This means that 39% of the area would have no treatments in it. Treatments would be implemented within the WUI at the same rate as the Proposed Action so the effects would be expected to be the same within that area. However the remainder of the area would be left untreated and the effects would be expected to be the same as the No Action Alternative where fire size, intensity and frequency area all expected to increase.

The Finney et al study found that reserving areas for no treatment did not have large effects on the overall reductions in fire behavior but that once 45% to 65% of the area was reserved from treatment the effectiveness declined (Finney, Selia et al. 2007). The area reserved from treatment in this alterative is close to that amount and all concentrated in a contiguous block, so it would definitely reduce the effectiveness at least within that area. The CWPP WUI Alternative would be expected to have increases in fire severity and size intermediate between the Proposed Action and the No Action Alternative with the most severe fire behavior occurring outside the CWPP WUI. The impacts of this increasingly severe fire behavior on the vegetation, wildlife, watershed, cultural, and wilderness resources in the Bodie Hills are described in Issues #1, 4, 8, 12, 15, 20, and 21 and the Cultural Resources section in Chapter 3 of this EA)

*Cumulative Effects*

The cumulative effects would be similar to the Proposed Action but the combined effects with private lands treatments would be smaller because together they would not reach the 1% threshold to moderate changes in the fire regime.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

Under Alternative 5 the only treatment in WSAs would be prescribed burning. The treatment rate inside WSAs would be greatly reduced because prescribed burning cannot always achieve the desired objectives at every site. Outside the WSA the treatment rate would be the same as the Proposed Action (about 1% of the landscape per year). Based on the mapped vegetation characteristics in the WSAs we estimated that about 0.3% of the WSAs could be treated per year with prescribed fire. The overall rate averaged across the entire landscape would be about 0.8% per year. This may help moderate the increases in fire size and severity that are expected but may not be enough to have a landscape effect. Within the WSAs it would definitely not be enough to have an effect on the fire regime according to the modeling estimates (Finney, Selia et al. 2007; Syphard, Scheller et al. 2011). The probability that a fire would encounter a treatment is lower than the Proposed Action. Overall the effect of the Limited Treatment in WSAs Alternative is expected to be that fire severity, frequency and size all increase in the future. The impacts of this increasingly severe fire behavior on the vegetation, wildlife, watershed, and cultural resources in the Bodie Hills as well as the Wilderness Character of the WSAs are described in Issues #1, 4, 8, 12, 15, 20, and 21 and the Cultural Resources section in Chapter 3 of this EA).

*Cumulative Effects*

The cumulative effects of the Limited Treatment in WSAs Alternative are expected to be similar to Proposed Action except in the WSAs where there would not be any cumulative benefit of

treatments on private lands because together the treatment rate may still be too low to affect the landscape level fire regime.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

Under Alternative 6 there would be no treatment in the WSAs which form large contiguous portions of the overall landscape. Outside the WSA the treatment rate would be the same as the Proposed Action (about 1% of the landscape per year). The overall rate averaged across the entire landscape would be about 0.7% per year. This may help moderate the increases in fire size and severity if they occur near treatments outside the WSAs but may not be enough to have a landscape effect (Finney, Selia et al. 2007; Syphard, Scheller et al. 2011). The probability that a fire would encounter a treatment is much lower than the Proposed Action. Overall the effect of this alternative is expected to be that fire severity, frequency and size all increase in the future. The impacts of this increasingly severe fire behavior on the vegetation, wildlife, watershed, and cultural resources in the Bodie Hills as well as the Wilderness Character of the WSAs are described in Issues #1, 4, 8, 12, 15, 20, and 21 and the Cultural Resources section in Chapter 3 of this EA).

*Cumulative Effects*

The cumulative effects would be similar to the Proposed Action but the combined effects with private lands treatments would be smaller because together they would not reach the 1% threshold to moderate changes in the fire regime.

## Vegetation:

***6. What are the long term past and potential future trends (including climate change) in vegetation, especially pinyon distribution, in the Bodie Hills and how will the project affect future dynamics? (Consider time frames as long as the Holocene, i.e. the last 12,000 years, and both natural and human induced trends.)***

*Background*

Late- Pleistocene - Holocene Vegetation History of the Region

During the last 12,000 to 30,000 years, a large proportion of the dominate species in the ecological systems that are the focus of this analysis were present in the western Great Basin with the exception of pinyon pine (Nowak et al. 1994a; Nowak et al. 1994b). Today pinyon pine is associated with juniper throughout much of its range. Both pinyon and juniper are present today in the Bodie Hills although pinyon pine is more common. Utah juniper (*Juniperus osteosperma*) and western juniper (*J. occidentalis*) were both present in the area 35,000 years ago and have remained in the area. Utah juniper is still common. Western juniper is now common in the Sierra Nevada to the west and has small populations in the Bodie Hills

.

At the end of the Pleistocene pinyon pine was in southern refugia in the area of the modern Mojave Desert and the southern San Joaquin Valley. During the Holocene (the period from 12,000 or 10,000 years ago to the present), pinyon pine began a northward expansion. In the eastern Great Basin it expanded more quickly than on the western side. On the western side, data from packrat middens shows slow northward migration in a variable pattern. In the White

Mountains data shows that pinyon had arrived as early as 9,000 years before present, but not in neighboring highlands until later (Jennings 1995). Closer to the Bodie Hills, sites at Hawthorne, NV and Slinkard Valley, show that pinyon arrived much later. After its arrival in the region it began to replace juniper in the existing woodlands (Jennings and Elliottfisk 1993; Nowak et al. 1994a; Nowak et al. 1994b).

The climate has changed throughout the Holocene. The general trend has been for a gradual increase in temperature after the Pleistocene. Researchers have identified several distinct periods in the Holocene history of the region based on their climate and vegetation. Divisions between periods have been made at slightly different time periods depending on the research site and type of data used. This discussion will generally follow Tausch et al. 2004.

Climate generally warmed and dried from 10,500-7,500 years ago to a very dry period from 7,500-5,000 years ago when there were notable low stands of major lakes. During this period species tended to move uphill including the juniper woodland (Miller and Wigand 1994; Davis 1999; Miller and Tausch 2001; Tausch, Nowak et al. 2004).

5,000 to 3,500 years ago the climate continued warm and dry with pulses of precipitation. From 3,500 to 2,600 years ago has been called the neoglacial period. It was wetter and cooler with precipitation focused in the winter (Miller and Wigand 1994; Davis 1999; Miller and Tausch 2001; Tausch, Nowak et al. 2004). This is the period when pinyon pine arrived in the area and replaced juniper woodlands as they expanded at mid to low elevations and increased in extent and density (Miller and Wigand 1994; Nowak et al. 1994a; Nowak et al. 1994b; Tausch, Nowak et al. 2004). The extent of conifer woodlands was possibly the closest to what we are experiencing today. This was also a period of high lake levels (Miller and Tausch 2001; Tausch, Nowak et al. 2004).

After the neoglacial period, there was a drought from 2,600 to 1,600 years ago. This led to a decrease in woodlands and downward movement of the upper treeline (Miller and Wigand 1994; Miller and Tausch 2001; Tausch, Nowak et al. 2004). Increased fire during this period probably contributed to reductions in woodland extent (Miller and Tausch 2001).

The post-neoglacial drought was followed by a period called the Medieval Climate Anomaly or the Medieval Warm Period from 1,600 years ago to 650 years ago. Climate became warmer and wetter with pulses of drought that show up in low stands of nearby lakes. Treeline moved upward and pinyon range expansion continued (Miller and Wigand 1994; Miller and Tausch 2001; Tausch, Nowak et al. 2004).

A brief period from 650 to 150 years ago has been called the Little Ice Age. It was wetter and cooler resulting in treelines that moved back downslope. Pinyon and juniper recovered from the Medieval Warm Period although fire frequency remained high limiting trees to open savannas and fire protected sites. This re-expansion of pinyon and juniper was still underway when the first Europeans arrived in the region (Miller and Wigand 1994; Miller and Tausch 2001; Tausch, Nowak et al. 2004).

Vegetation Dynamics After Euroamerican Settlement

After European contact the rate of pinyon and juniper expansion and infilling accelerated (Miller and Wigand 1994; Miller and Tausch 2001; Tausch, Nowak et al. 2004; Johnson and Miller 2008; Miller, Tausch et al. 2008). This has been noted by many researchers and land managers. Climatic conditions from Euroamerican contact until about 1916 favored continued pinyon and juniper expansion. After 1916 climate conditions became warmer and drier (Miller and Tausch 2001; Tausch, Nowak et al. 2004; Mallek and Safford 2011). The history of pinyon and juniper dynamics during the Holocene demonstrates that typically these climate conditions would favor reductions in extent of pinyon and juniper often in combination with increased wildfire (Miller and Tausch 2001; Tausch, Nowak et al. 2004). However, pinyon and juniper expansion and infilling has continued to today both with expansion down and upslope as well as infilling of sites with open stands. In a study of pinyon juniper in 6 sites across 4 states in the Great Basin showed that two-thirds of the landscapes had been colonized by trees since 1860. The timing of the most rapid tree establishment varied among sites. In the sites most similar to the Bodie Hills in NV, it occurred between 1900 and 1950 with a continued establishment at a declining rate, possibly due to the reduced sites available for expansion (Miller, Tausch et al. 2008). A recent review of pinyon and juniper dynamics across the western United States makes the point that there are strong gradients across the west with different species and different disturbance regimes (Romme, Allen et al. 2009). Several studies have documented the pinyon expansion in the region of the project where stands are typically dominated by pinyon with a minor component of juniper. Burwell documents expansion of pinyon at the lower elevation treeline in the White Mountains, Glass Mountains, Bodie Hills, and nearby sites in the eastern Sierra with rapid rates of expansion and infilling from 1900 to 1960 (Burwell 1998). At sites in central Nevada which have similar patterns of pinyon-juniper dynamics expansion and infilling have also been documented (Weisberg, Lingua et al. 2007; Bauer and Weisberg 2009). Weisberg et al. found 11% expansion in the last 30 years and 33% infilling in that same time period (Weisberg, Lingua et al. 2007).

The causes of the accelerated pinyon-juniper expansion being observed across the Great Basin have been debated and attributed to multiple factors. These include fire suppression, grazing removing fine fuels especially at the turn of the last century, climate change, and atmospheric fertilization by increasing CO2 and Nitrogen deposition from human sources. It is difficult to find more than circumstantial evidence for any of these causal factors. There is some evidence from nearby studies to support fire suppression being a factor. In a detailed study of stand age and fire history, Bauer and Weisberg found that fires generally originate in the valley bottoms and sagebrush sites and burn into the edges of pinyon and juniper stands (Bauer and Weisberg 2009). Suppression of these fires allows establishing trees to grow to a size that can more easily escape mortality in a fire and suppress the shrubland vegetation enough to prevent fire from spreading except under the most severe weather conditions. The other factors may also play a role as well, but it seems clear that fire suppression is playing a role in the Great Basin.

Projections for Future Vegetation with Climate Change

Climate will certainly change in the future because it is always changing due to global cycles. Scientific consensus also has shown that human alteration of the atmosphere due to greenhouse gas emissions is changing the current climate and projects that it will change rapidly in the future

(IPCC 2007). Many researchers have modeled potential climate under various emissions scenarios, but none of the predictions have been done at a scale fine enough to make predictions for specific landscapes like the Bodie Hills. Pan et al scaled down the models to a grid cell of 4 km which provides enough resolution to estimate what might be happen in the region of the Bodie Hills. The models used in this study estimated that temperatures would increase in the area up to 1.5 degrees in the winter and 2 degrees in the summer by 2050. Precipitation is predicted to stay the same or be reduced by up to 20 mm/yr in the same time period (Pan, Chen et al. 2011). There are many climate change scenarios and many global circulation models so the most accurate estimate of future conditions may be an average or consensus among them. According to Dettinger (2005) as cited in Mallek and Safford (2011), the most common prediction for California among the recent modeling efforts is warming by about 9° F by 2100, with precipitation similar or slightly reduced compared to today. Seasonality of precipitation can be more important than amount in determining vegetation response. Almost all the models predict drier summers than current condition. Snowpacks are predicted to be much smaller (-22% to -93%) due to snowmelt peaking 3 to 24 days earlier (Mallek and Safford 2011). This would be very important for vegetation in the Bodie Hills where snowpack is the largest source of moisture and has a strong influence on plant physiology and on the fire regime. An earlier snowmelt results in a longer fire season with lower fuel moistures for a longer time at the end of the season.

Models using scaled down results from several of the predicted climate change scenarios over the next century for the California and Nevada area can be used to predict what the consequences will be for vegetation. Multiple studies find that sagebrush and pinyon-juniper ecosystems will decline and become more fragmented over the next century (Lenihan, Bachelet et al. 2008; Ackerly, Loarie et al. 2010; Mallek and Safford 2011; Finch 2012; Schlaepfer, Lauenroth et al. 2012).

A recent review of the modeling and predictions for vegetation change under climate change in the Interior American West found that in general studies predict that sagebrush ecosystems will move northward and become more fragmented. Pinyon-juniper ecosystems were expected to move upslope and northward, continuing the overall trend of their movement during the Holocene (Finch 2012). For the Bodie Hills area this would mean shrinking areas occupied by both ecosystem types and a shift up hill. Lower elevation areas would be replaced by more arid systems such as desert shrublands typical of the Owens Valley or by exotic species. Ackerly et al. found that these ecosystems would be reduced by 1 to greater than 10 fold from their current extent in the next century (2010). Lenihan et al. used the MC1 model to evaluate three different climate scenarios for the state of California and found that shrublands (including sagebrush shrublands/steppe) and woodlands (including pinyon-juniper woodlands) both decreased and were replaced by grasslands (2008). This model uses more than just the current climate envelope for ecosystems to predict what their future extent will be. It uses three different modules to account for the effects of biochemistry, biogeography, and fire disturbance. The biochemistry module accounts for changes in soil moisture, productivity and the effects of CO2 fertilization which has been shown to alter plant productivity and favor woody species. The biogeography module determines the mixture of plant life forms based on their climate envelope. The fire module simulates fire disturbance by modeling fire occurrence, behavior and effects using fuel and climate characteristics. The reductions in shrublands and woodlands that were predicted in

this study were primarily due to increased fire frequency causing the conversion to grasslands (Lenihan, Bachelet et al. 2008).

Increases in fire frequency have been born out in multiple modeling efforts as well as the current trends already observed at the end of this century (see Issue 5) (Westerling, Hidalgo et al. 2006; Miller, Safford et al. 2009; Mallek and Safford 2011; Westerling, Bryant et al. 2011). In the Great Basin and the Southwest it has been shown that introduced annual grasses are responsible for changing the fire regime and are favored by increasing severe fires (Brooks, D'Antonio et al. 2004). Much of this conversion to grasslands in the Bodie Hills would likely involve conversion to cheatgrass. Increases in cheatgrass are predicted throughout the Great Basin and the Southwest with climate change over the next century. Climatic factors including longer seasons, an increase in rain vs. snow and a feedback between the increasing fire frequency and severity and cheatgrass modifications of the fire cycle are expected to facilitate these increases (Abatzoglou and Kolden 2011). Other analyses have predicted that climate change will eliminate cheatgrass from its southern extent in the southern Great Basin (Bradley 2009), however, other authors have pointed out that this analysis is based on a narrow bioclimatic envelope for cheatgrass which is continuing to expand and evolve into new habitats (Finch 2012). Even if cheatgrass is no longer climatically favored in the Bodie Hills area by the end of the century, it will probably be replaced by red brome (*Bromus madritensis* ssp. *rubens*) which occupies hotter drier areas to the south. For a species undergoing such dynamic range expansion based on disturbance mechanisms, a mechanistic modeling approach is necessary such as the one used by Abatzoglou and Kolden (2011) and Lenihan, Bachelet et al. (2008).

The predicted changes in extent for pinyon-juniper and cheatgrass and the role of fire are consistent with the Holocene history of these vegetation types in the region. The expected changes in climate are similar to the conditions during the Medieval Warm Period from 1,600 to 650 years ago and the drought that proceeded it from 2,600 years ago when evidence from charcoal in soil profiles and lake beds suggests that fire played a large role in controlling and shifting pinyon pine distribution and in increasing the ratio of perennial grasses to sagebrush (Miller and Wigand 1994; Miller and Tausch 2001; Tausch, Nowak et al. 2004).

The TNC analysis of vegetation conditions in the Bodie Hills included climate change in the modeling of the management scenarios over the next 20 and 50 years. Provencher, Low et al. used tree ring records of climate during five 50-yeartime series from the drier Medieval Warm Period (524 to 1,459 years AD) to simulate the likely climate over the next 50-years (2009). Multipliers were also used to account for the effects of $CO_2$ fertilization of shrubs and trees and for the effects of reduced soil moisture causing tree mortality. A fire series was also used by sampling the actual fire histories of nearby landscapes that have already experienced elevated severe fire frequencies to model the expected changes in the fire regime. The climate information was also used to predict other disturbances such as insect and disease outbreaks. Within the modeled period the changes balanced out and there were few statistically significant effects on the outcomes except some increased mortality of shrubs and trees in some systems (Provencher, Low et al. 2009).

In summary, during the management window for this project, the competing trends of continued pinyon expansion and reductions due to increased fire and climate change are expected to

balance each other and the net outcome may be a slight increase or slight decrease in pinyon and juniper extent with corresponding changes in sagebrush. However, in the longer term, beginning in the next 50 to 100 years, it is reasonable to expect that climate change will cause sagebrush and pinyon-juniper ecosystems to be reduced in their extent in the Bodie Hills and shift their ranges shifting upward. They are likely to be replaced by desert shrubs or exotic annual grasslands. Increasing fire will play an important role in these changes, especially conversion to exotic annual grasslands.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action Alternative the ecosystems experiencing climate change over the next 50 to 100 years will be dominated by late seral classes with very uniform seral conditions across the landscape. Expansion of pinyon pine will have created a relatively continuous belt of woodlands in the middle elevations of the Bodie Hills. As discussed in Issue 5, the ecosystems under the No Action Alternative will be more vulnerable to large scale severe wildfire and conversion to exotic annual grasses. These large scale fires are the mechanism expected to facilitate most of the reduction in extent of both the sagebrush ecosystems which are the target of this proposal and the true pinyon woodlands. These reductions and conversions to either desert shrubs or exotic annual grasslands would be expected to be rapid under this alternative because of the condition of the ecosystems adapting to a changing climate and a changing fire regime.

*Cumulative Effects*

The effects analyzed in this issue depend on the condition of the ecosystems experiencing a changing climate, so they are expected to be the same as the cumulative effects analyzed for Ecological Departure in Issue 1. Vegetation treatments on private lands may help reduce Ecological Departure and make the ecosystems slightly more resilient to climate change but not at a scale that will affect the trajectory across the entire Bodie Hills landscape.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

Under Alternative 2, the ecosystems experiencing climate change will have fewer high risk classes (see Issue 1). This should make these ecosystems more resilient to the changes in climate that are expected. The proposal involves removing pinyon pine from shrubland sites, but this is not expected to exacerbate the predicted reductions in extent of the pinyon-juniper ecosystem under climate change. This is because the Alternative will only cut a small amount (less than 10%) of the pinyon pine on the landscape, and only from deep soil shrubland sites, not from true fire protected pinyon woodlands. By introducing gaps in the infilling that is connecting scattered true pinyon woodlands and increasing the pinyon density across the landscape, the Alternative will reduce the risk of large sudden losses of pinyon woodland due to severe crown fires which are expected to increase due to climate change over the next century.

The replacement of sagebrush and pinyon-juniper ecosystems by desert shrubs and exotic annual grasslands predicted under climate change during this century is expected to be primarily mediated by increasing fire. The analysis of the effects of this Alterative on the fire regime in Issue 5 predicts that this Alternative will help reduce the predicted increases in fire frequency, severity, and size. Because of this effect, it is likely that this Alternative will make the sagebrush

and pinyon-juniper ecosystems of the Bodie Hills more resilient to climate change. Changes in extent with shifts upward in elevation would still be expected, but the rate of change may be less which is very important to allow vegetation and wildlife to adapt to climate change. Replacement by exotic annual grasslands may be reduced compared to the No Action Alternative.

The scientific literature on natural resource management in the face of climate change recommends a suite of strategies usually described as resistance, resilience, and adaption (Millar, Stephenson et al. 2007). The goal of the Proposed Action is to promote the ability of the ecological systems of the Bodie Hills to do all three of these. The Proposed Action promotes resistance to change by reducing the likelihood of increasing severe wildfire in the next 10-20 years (see Issue 5). It also reduces the risk of cheatgrass invasion and conversion during that time period (see Issues 1 and 8). During that period it will also help protect high value assets from increasing fire and cheatgrass invasion including Bodie State Park, important habitat for at risk wildlife species (sage-grouse and pygmy rabbit) and old growth pinyon groves. Over a longer time period, it should also help promote resilience to change. The TNC analysis modeled the effects with climate change over up to 50 years and the reductions in ecological departure and high risk classes over the time period of the project result in even greater reductions in ecological departure and high risk vegetation classes over the 50 year time frame. Ecological systems that are in good condition with a heterogeneous pattern of seral stages across the landscape are more resilient to disturbances and invasions by non-native species or even species from a different climate zone such as the desert shrub taxa from lower elevations. With reduced risk of large scale severe fire the mechanism for these types of conversions is reduced as well.

Finally, the Proposed Action should also help the ecological systems of the Bodie Hills adapt to the changes that will happen. By slowing the changes by increasing resistance and resilience the species will have more time to adapt and migrate. By reducing the threats from fire and invasive species the changes are more likely to be in a desirable direction; from the current native ecosystems to new ecosystems with species native to climate zones from nearby rather than exotic species that completely change the disturbance regime and the ecological services provided by the Bodie Hills.

*Cumulative Effects*

As discussed for the No Action Alternative, the effects analyzed in this issue are expected to be the same as the cumulative effects analyzed for Ecological Departure in Issue 1. In combination with this Alternative, vegetation treatments on private lands may increase the reductions in Ecological Departure and make the ecosystems slightly more resilient to climate change.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Because the effects on Ecological Departure and High Risk vegetation classes in this Alternative are expected to be greater than the Proposed Action, this Alternative is expected to make the sagebrush and pinyon-juniper ecosystems more resilient in their long term trajectory under climate change.

*Cumulative Effects*

The cumulative effects of this Alternative are expected to be the same as those for the Proposed Action because the nature of the direct and indirect effects is the same but potentially more effective.

*Alternative 4: Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

Because the effects on Ecological Departure and High Risk vegetation classes in this Alternative are expected to be less than the Proposed Action, this Alternative is expected to be less effective at making sagebrush and pinyon-juniper ecosystems more resilient in their long term trajectory under climate change. The effects would likely be very similar to the No Action because the primary mechanism of change is expected to be changes in the fire regime and the analysis of the effects to the fire regime found that the amount of treatment under this Alternative is not great enough to be likely to change the fire regime across the landscape (see analysis of Issue 5).

*Cumulative Effects*

The cumulative effects of this Alternative are expected to be similar to the No Action Alternative. See the cumulative effects for Alternative 1 above.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

The effects of this Alternative on the long term trajectory of the vegetation of the Bodie Hills under climate change in the next century are expected to be the same as the other reduced acreage alternatives because they are not expected to treat enough of the landscape to affect the fire regime. See the analysis of Alternative 4 above.

*Cumulative Effects*

The cumulative effects of this Alternative are expected to be the same as the other reduced acreage alternatives because the effects are the same. See the analysis of Alternative 4 above.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

The effects of this Alternative on the long term trajectory of the vegetation of the Bodie Hills under climate change in the next century are expected to be the same as the other reduced acreage alternatives because they are not expected to treat enough of the landscape to affect the fire regime. See the analysis of Alternative 4 above.

*Cumulative Effects*

The cumulative effects of this Alternative are expected to be the same as the other reduced acreage alternatives because the effects are the same. See the analysis of Alternative 4 above.

***7. How do special status plant species respond to disturbance and how will they be affected by excluding them from the treatment units?***

The Proposed Action, as originally described, excluded all Sensitive plants from treatment. The design features for Sensitive plants have been modified to consider including some occurrences of Sensitive plants in treatment units in response to comments received in scoping that some species may benefit from the treatments.

*Background*

The BLM uses the term "Special Status Plants" to include: 1) Federal Endangered, Threatened, and Proposed plants, and 2) BLM Sensitive plants. BLM Sensitive plants (Sensitive plants) are those species that are not Federally listed as Endangered or Threatened or Proposed for Federal listing, but which are designated by the BLM State Director for special management consideration. By national policy, Federal Candidate species are automatically treated as Sensitive. The California State Director has also conferred sensitive status on California State Endangered, Threatened, and Rare species, on species on List 1B (plants rare and endangered in California and elsewhere) of the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California (unless specifically excluded by the State Director on a case-by-case basis), and on certain other plants the State Director believes meet the definition of Sensitive.

CNPS list 2 and 4 plants are not considered to be Sensitive plants by the BLM (unless specifically designated as such by the BLM), but surveys for CNPS list 2 and 4 plants will be conducted concurrent with surveys for sensitive plants. CNPS list 2 and 4 plants will be assessed similarly to Sensitive plants (as discussed in the Design Features and the analysis below). However since CNPS list 2 and 4 plants are not considered to be BLM Sensitive they are not specifically addressed in the analysis.

No Federally threatened, endangered or candidate species are known to occur or are likely to occur within the Bodie Hills Upland Vegetation Restoration project area based on historical records, field monitoring, and/or habitat suitability.

There are 10 Sensitive plant species that are known or reported to occur within the project area. There is very limited information on how seral class (age class) of the vegetation the Sensitive plants occur in affects their survival; there is also little information on how the Sensitive plants in the Bodie Hills respond to disturbances such as fire or mowing. On a much broader scale, a literature review of U.S. Fish and Wildlife Service listed (threatened or endangered) and candidate plant species found that the long term effects of fire can be beneficial to listed species by creating openings for seedling establishment, encouraging reproduction and by reducing competition from invasives or other plant species. However for some species fire can be detrimental (Hessl and Spackman 1995). Based on the known Sensitive plant habitat conditions within the Bodie Hills, preliminary assessments can be made for several of the species response to fire or other disturbances that may change the seral class of the surrounding vegetation communities.

Habitat and location information for the following species is based on past survey data by the BLM as well as information displayed in the California Natural Diversity Database (CNDDB)

and the Nevada Natural Heritage Program. CNDDB buffers occurrence locations based on reported size of an occurrence as well as the known accuracy of a reported occurrence, therefore species occurrences may overlap with multiple ecological types. For example *Astragalus oophorus* var. *lavinii* is shown to occur in a large area because the reported occurrence gives only a general location.

- *Astragalus johannis-howellii* (Long valley milk-vetch)
  Perennial herb. Within the Bodie Hills *A. johannis-howellii* is known only from the Dry Lakes Plateau area where it occurs in the Montane Sagebrush Steppe and Low Sagebrush ecological system. In the Bodie Hills occurrences of *A. johannis-howellii* plants number well into the 1,000's. *A. johannis-howellii* occurs in similar habitats outside of the Bodie Hills in the eastern Sierra Nevada such as the Long Valley area.

- *Astragalus oophorus* var. *lavinii* (Lavin's milk-vetch)
  Perennial herb. Reported to occur in the Bodie Hills but the actual location is unknown. Habitat exits for *A. oophorus* var. *lavinii* in the project area but it has not been recorded since the original observation. Recent surveys within the area it is reported to occur did not locate the occurrence. *A. oophorus* var. *lavinii* is also reported to occur in the nearby Sweetwater Mountains and is known to occur just outside the project area in Nevada. In Nevada *A. oophorus* var. *lavinii* occurs in open areas among pinyon-juniper or sagebrush habitats on gravelly clay slopes or outcrops derived from volcanic ash or carbonate.

- *Astragalus pseudiodanthus* (Tonopah milk-vetch)
  Perennial herb. Within the Bodie Hills the species is restricted to the southern edge of the project area where it occurs on or adjacent to stabilized dunes in the Wyoming Sagebrush-sandy ecological system. Outside the project area *A. pseudiodanthus* occurs north of Mono Lake in similar habitat and in several locations in Nevada.

- *Boechera bodiensis* (Bodie Hills rock cress)
  Perennial herb. *B. bodiensis* occurs in several locations in the Bodie Hills project area. *B. bodiensis* typical grows in openings on hillsides or in rocky outcrops among sagebrush. In the project area it occurs most often in the Montane Sagebrush Steppe and the Low Sagebrush ecological systems but also occurs in the Mountain Shrub ecological system. *B. bodiensis* occurs on neighboring United States Forest Service (USFS) lands in Mono County and Nevada, as well as in the Granite Mountains and in Sequoia and Kings Canyon National Parks.

- *Calochortus excavatus* (Inyo mariposa)
  Perennial herb. The CNDDB lists *C. excavatus* as occurring in the Travertine Hot Springs area. The occurrence information is from 1949 and *C. excavatus* has not been recorded at that location or anywhere else in the Bodie Hills since then. *C. excavatus* occurs in alkali meadow habitat in Inyo and southern Mono County. It is possible that the reported occurrence no longer exists or was miss-identified originally.

- *Cusickiella quadricostata* (Bodie Hills cusickiella [draba])

Perennial herb. In the Bodie Hills *C. quadricostata* occurs in multiple locations. In the project area it is most common in the Low Sagebrush ecological system but occurrences also overlap with the Montane Sagebrush Steppe, Wyoming Sagebrush and Basin Wildrye – big sagebrush ecological systems. In the Bodie Hills *C. quadricostata* has the greatest number of occurrences (approximately 35%) of currently documented Sensitive plants in the area and likely has the greatest number of individual plants. *C. quadricostata* also occurs outside the project area on neighboring USFS lands in California and Nevada.

- *Eriogonum alexanderae* (Alexander's buckwheat)
  Perennial herb. *E. alexanderae* is reported to occur in the Bodie Hills between Potato Peak and Bodie Mountain but the actual location is unknown. The recorded observation is from 1967 and has not been documented since then. The reported location was recently (2013) surveyed and the occurrence was not located. In the project area *E. alexanderae* may occur in the Low Sagebrush, Montane Sagebrush Steppe or Mountain Shrub ecological systems. *E. alexanderae* is also reported to occur in Nevada.

- *Phacelia monoensis* (Mono phacelia):
  Annual spreading to ascending herb. In the Bodie Hills *P. monoensis* is typically found along road edges or road cuts in grayish, brownish, or reddish clay soils that are mostly of andesitic origin. In the project area *P. monoensis* most commonly occurs in the Low Sage and Montane Sagebrush Steppe ecological system. Annual species such as *P. monoensis* can vary in number from year to year and may not occur at all in some locations in some years depending on conditions (precipitation, temperatures, etc.). *P. monoensis* occurs in adjacent areas outside the project area in California and Nevada.

- *Polyctenium williamsiae* (William's combleaf):
  Perennial low growing herb. *P. williamsiae* is known from only a few locations in the Bodie Hills. *P. williamsiae* is generally restricted to the margins of seasonal lake shores, historic lakeshores or meadows. In the Bodie Hills *P. williamsiae* plant numbers have varied depending on the survey year; in 2011 one occurrence was re-surveyed and individuals numbered over 1,000, which was a significant increase from the previous survey. *P. williamsiae* occurs elsewhere in California as well as in Nevada.

- *Streptanthus oliganthus* (Masonic Mountain jewel flower):
  Perennial upright herb. *S. oliganthus* occurs in a few locations within the project area, it generally occurs in rocky outcrops and less than 100 plants occur at each site. *S. oliganthus* overlaps with the Montane Sagebrush Steppe, Low Sagebrush, Mountain Shrub and Wyoming Sagebrush – Loamy ecological systems. *S. oliganthus* also occurs on adjacent USFS land in the Bodie Hills.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action Alternative Sensitive plants would persist under current management and would continue to be influenced by events such as wildfire, climate change, ongoing habitat/vegetation changes, as well as anthropogenic actions such as wildfire suppression, livestock grazing, recreation activities, etc.

The No Action Alternative would result in no direct impacts to sensitive plants however indirect impacts may occur.

The Low Sage ecological system supports the majority of known Sensitive plant occurrences (*C. quadricostata* is the most common) in the Bodie Hills. Currently a majority of the low sagebrush in this ecological system is classified in late seral classes (meaning the majority of low sagebrush stands are fairly old – see Table 20 in Issue 5 for approximate fire return intervals for different ecological systems). It is expected (based on modeling of the percentage of High Risk Vegetation Classes in Low Sage) that annual grass cover and pinyon cover will increase over the course of the next 50 years without active management. Increases in pinyon cover and annual grass cover may result in the loss of Sensitive plant habitat that occurs at these locations. Increases in vegetation density may also promote higher intensity or more frequent wildfires that may adversely affect the habitat conditions of Sensitive plants that utilize the Low Sage ecological system.

Openings in the Montane Sagebrush Steppe as well as transition zones between the Low Sage ecological system and the Montane Sagebrush Steppe, Wyoming Big Sagebrush, Mountain Shrub or Basin Wildrye – Big Sagebrush ecological system support many of the other Sensitive plant occurrences not occurring in the pure Low Sage. These openings and transition zones that support Sensitive plant occurrences may be lost under current management due to shrub or tree expansion and/or non-native annual grass encroachment. As with the Low Sage ecological system, increases in vegetation density may also promote higher intensity or more frequent wildfires that may adversely affect the habitat conditions of Sensitive plants that occur in these ecological systems.

In the Montane Sagebrush Steppe ecological system, in the absence of active management, it is expected that the 50 year trend will be towards a system with a greater percentage of *early* and/or *mid-open* seral vegetation classes (see Appendix B for description). Although the Montane Sagebrush ecological system will is projected to progress toward more early seral vegetation, this change will likely be due to wildfires. In wildfire situations, management (e.g., the BLM) will not have the ability to choose when and where the fire occurs therefore wildfires will likely burn in areas where the shrub cover is the greatest and/or annual grasses are present. Therefore the resulting wildfires may be larger and of a higher intensity (see Issue 5) than what would have occurred in a landscape with more variance in seral class or under controlled burned settings. High intensity fires are more likely to impact Sensitive plants (compared to low intensity). The risk of impacts to Sensitive plants is greater in the current wildfire conditions (burning in the current vegetation densities) simply because they are less controllable and generally burn larger areas. Impact may come in the form of direct mortality due to the intense heat or loss of habitat due to the extensiveness of the burn or conversion to invasive plants.

The current trend for the ecological systems where many Sensitive plants occur in the Bodie Hills is for increased coverage of pinyon, shrub species, and/or annual grasses. For Sensitive plants that utilize open, sparsely vegetated habitat, continued increases in cover of native species such big sagebrush or pinyon could result in direct loss of habitat. Increases in annual grasses may also result in direct loss of habitat or increased wildfire frequency which could adversely

impact Sensitive plants. The increasing cover of woody native species may also lead to greater risk for high intensity wildfires which could adversely impact Sensitive plants. Overall, the No Action Alternative is expected to maintain sensitive plant occurrences and habitat in the short term but it leaves Sensitive plant habitat more vulnerable to loss due to encroachment from native species or from high intensity wildfire which may result in significant mortality or lead to the increase in annual grasses or other invasive plants.

*Cumulative Effects*

The cumulative effects analysis area is the entire Bodie Hills landscape as described in Issue 1 and shown in Figure 6. All of the Sensitive plants that occur within the project area also occur outside of the project area either in the cumulative effects analysis area and/or in areas beyond.

Potential cumulative impacts in the analysis area include climate change, development, fire suppression, livestock grazing, mining, recreation, vegetation management and wildfire. All past and current effects of these actions have contributed to the current condition of Sensitive plants within the analysis area; therefore these effects are reflected in the analysis of effects of the No Action Alternative.

There are future actions or events that have potential to have cumulative effects to Sensitive plants when combined with any of the Alternatives. Climate change and wildfire could have potential cumulative effects and are accounted for in the modeling of future conditions of the ecological systems in the Bodie Hills and are therefore reflected in the discussion of direct and indirect effects of the Alternatives.

Livestock grazing – Historically grazing in the area was much higher than what present use is and what future use is expected to be (Tausch, Nowak et al. 2004) therefore it is not expected that future grazing would be an added cumulative effect when combined with any of the Alternatives.

Mining – At this time, as discussed in Issue 1 mining is not reasonably foreseeable. See Cumulative Effects of Issue 1.

Recreation – Although the Bodie Hills is becoming a more popular recreation area, the human use is still less than when the area was actively mined, additionally the majority of the current use is generally restricted to developed areas and established roads and routes therefore recreation is not expected to be an additive cumulative effect to any of the Alternatives.

Vegetation treatments – Vegetation treatments are planned by some private land owners within the cumulative effects analysis area. Some of the planned projects focus on meadow vegetation which is not a vegetation type that the Sensitive plants of the Bodie Hills generally occur. Some private treatments will also treat pinyon and juniper in the Montane and Low Sagebrush ecological systems. These ecological systems do support Sensitive plants therefore there is some chance of Sensitive plants being impacted either positively or negatively. Treatments occurring on private land could result in direct negative impact to Sensitive plants, however treatments may indirectly help maintain Sensitive plant habitat in places by reversing conifer infilling.

Private treatments may also help to prevent future, large, high intensity wildfires from spreading and impacting Sensitive plants on public land.

Overall, treatments by private land owners combined with the No Action Alternative are not expected to add measurably to the direct and indirect effects discussed above. This is due to the relatively small size of potential treatment area occurring on private land in the context of the cumulative effects analysis area. Similarly, it is not expected that treatments on private land would result in an additive effect when combined with any of the action Alternatives.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action would treat approximately 10% (~17,000 acres) of public land within the Bodie Hills project area (~167,000 acres) over a 10 year period. The bulk of these treatments would occur in the Montane Sagebrush Steppe (~10,550 acres) and Low Sage (~2,050 acres) ecological systems.

Many of the of the known occurrences of Sensitive plants in the Bodie Hills occur in Low Sage or in open areas in or along the edges of the Montane Sagebrush Steppe ecological system, therefore Sensitive plants have potential to be present within or adjacent to proposed treatment units.

Following the Sensitive plant species *Design Features* (Chapter 2 of this EA) would minimize or prevent the potential for adverse impacts to Sensitive plants. The rational for excluding some species or occurrences from direct treatments is due to; there being a limited number individual plants present in a given occurrence; the species has a limited distribution within the Bodie Hills; and/or there is limited knowledge about how a given Sensitive species would respond to fire or other disturbance.

Because broadcast prescribed burning would be the preferred treatment method for a majority of the treatment acres in the Montane Sagebrush Steppe ecological systems, ensuring that all Sensitive plant occurrences are excluded from treatment may not be realistic because there is potential that occurrences may be missed during pre-treatment surveys or the prescribed fire may burn outside of the anticipated area. Direct impacts that may occur due to prescribed burning include the burning (consumption) of above ground plant parts. Depending on the timing and intensity of the burn, this may result in reduced reproduction ability, decreased plant vigor or complete mortality. If below ground plant parts are not killed by the fire it is possible that plants would re-sprout the following year. More intense fires (as would be expected in wildfire situations) would likely lead to complete mortality of plants. During the implementation of prescribed burning, or any treatment, trampling (due to foot traffic) of plants may occur. Trampling has the potential to disrupt the plants reproduction or vigor or cause mortality. However, trampling impacts associated with the project implementation would be difficult to distinguish from those of casual use, wildlife or livestock and are not expected to adversely impact populations in the Bodie Hills. Furthermore, following project Design Features is expected to minimize these risks.

Historically the ecological systems where broadcast prescribed burning is proposed likely experienced periodic fire every 40 to 80 years. Therefore plants that live in those systems are likely to be somewhat adapted to fire. However historically, fires would likely have burned with less intensity (compared to a wildfire today) due to fires being more frequent and therefore there being a less continuous fuel load.

The following describes the potential for impact and effects to specific Sensitive plants.

*Cusickiella quadricostata*, which primarily occurs in Low Sage ecological systems, represents approximately 35% of the currently documented Sensitive plant occurrences in the Bodie Hills area. Treatments in the Low Sage ecological system are primarily restricted to hand cutting of pinyon or juniper trees, individual shrubs or mowing. These types of treatment would not necessarily be excluded from areas that contain *C. quadricostata*. Areas considered for prescribed burning treatments which contain *C. quadricostata* plants could also be considered for treatment. Direct adverse impacts (such as piling and burning directly on occurrences) to *C. quadricostata* (or other Sensitive plants) in the Low Sage ecological system could easily be avoided by following the Design Features. The following are examples of how Design Features may be used.

- Pre-treatment surveys for occurrences and establishment of treatment exclusion areas around plants.
- Mowing could be done so as to avoid plants or be conducted at times when the plants are not flowering or fruiting. The use of mowers with low tire air pressure is not expected to result in mortality (based on BLM observations of where *C. quadricostata* grows in dirt road ways) to *C. quadricostata* but may result in impacts similar to trampling, as discussed above.
- A no burn buffer could be placed around Sensitive plants within prescribed burn units or the shrubs around Sensitive plants could be manually thinned to reduce the fire intensity.

The Design Features are intended to be used so treatments can implemented without causing direct mortality to sensitive plants or adverse impacts to sensitive plant populations. However regardless of precautions taken, there is some potential that mortality to individual *C. quadricostata* plants within treatment areas could occur. Although mortality to individual plants would have short term negative impacts to a specific occurrence, the treatments as a whole are not expected to have a measurable adverse impact to the Bodie Hills population. Overall treatments are expected to maintain or improve C. *quadricostata* occurrences and habitat.

*A. johannis-howellii*. It is unknown how this species responds to fire or other disturbances. The mean fire return interval can range between 40-80 years in Montane Sagebrush Steppe and over 200 years in Low Sage (the ecological systems plants typically occur in). Due to the high number of individuals that occur in the Bodie Hills, if a treatment unit contains *A. johannis-howellii*, treatment would not necessarily be excluded from treatment but the treatment method and amount of area proposed for treatment would be given serious consideration. For example, if there were conifer infilling in areas that contained *A. johannis-howellii* treatment may still occur, however it would likely be done using hand cutting and trees would not be pilled on or

immediately adjacent to *A. johannis-howellii* plants. The potential for direct effects are similar to those discussed above for *C. quadricostata*.

*Astragalus oophorus* var. *lavinii*. Little is known about this plant in the Bodies Hills, including how it responds to fire or other disturbances. If plants are discovered in the Bodie Hills, they would be avoided during treatments due to the lack of known plants/occurrences in the Bodie Hills. Treatments such pinyon/juniper cutting and piling and burning could still occur but plants would be avoided by establishing buffers around occurrences. No direct impacts are expected to occur.

*Astragalus pseudiodanthus*. It is unknown how this plant responds to fire or other disturbances. Based on the plants typical habitat it is unlikely that historically the species experienced fire at frequent intervals. Because of the habitat where *A. pseudiodanthus* occurs in the project area, it is unlikely to be included in the treatment areas. However if plants are found to occur within a treatment unit they would treated in a similar fashion as indicated above for *A. oophorus* var. *lavinii.*

*Boechera bodiensis*. It is unknown how *B. bodiensis* responds to fire or other disturbances. However occurrences in openings of sagebrush or other shrubs (compared to plants occurring on sparsely vegetated rocky outcrops) may have historically experienced fire at intervals of every 40-80 years. It is expected that *B. bodiensis* would occur within potential treatment units. Buffers would be placed around plants that occur in treatment units preventing direct impacts to most plants. If direct impacts due occur they are expected to be similar as those discussed above for *C. quadricostata*. The species is expected to benefit from treatments that maintain openings in shrub vegetation.

*Calochortus excavatus*. The BLM has conducted prescribed burning and mechanical treatments in *C. excavatus* habitat in Inyo County. These treatments have been successful at reducing competition from upland vegetation. If *C. excavatus* is found to occur within a treatment unit, individual plants would be buffered to prevent direct impact but the treatments could still occur within the plants habitat.

*Erigonum alexanderae*. It is unknown how this plant responds to fire other disturbances. If it is found in a treatment unit, plants would be buffered from direct treatment. However treatments in the vicinity of the occurrence may still occur following Design Features and in similar fashion to *A. oophorus* var. *lavinii*.

*Phacelia monoensis*. Due to *P. monoensis* frequently occurring along road edges it has likely adapted to some level of disturbance and an early seral vegetation state. Therefore it can be expected that occurrences may respond favorably (or at least not negatively) to some forms of disturbances. There is potential for *P. monoensis* to occur within potential treatment units. Treatment within units that contain *P. monoensis* would either be done so as to avoid direct treatment of plants or timed to be implemented prior to plant emergence or after fruits have dispersed. There is some potential that treatments may result in mortality of individual plants however by following the Design Features, impacts are not expected to be adverse to populations in the Bodie Hills.

*Polyctenium williamsiae*. It is unknown how this plant responds to fire or other disturbances but based on its habitat it is unlikely that historically the species experienced regular fire (unless burned by Native Americans). Because of the habitat where *P. williamsiae* occurs in the project area, it is unlikely to be included in treatment areas. However if plants do occur in a treatment unit, project Design Features would be followed preventing the probability of direct impact.

*Streptanthus oliganthus*: The response of *S. oliganthus* to fire or other disturbances is unknown. It is possible that *S. oliganthus* would occur within potential treatment units. Similar to many of the above mentioned Sensitive plants, due to its limited distribution and abundance within the project area it would likely be excluded from direct treatment. However treatment could still occur around the plants as discussed above for *A. oophorus* var. *lavinii*.

As noted above there is potential that any of the treatments could result in burning or trampling via people or equipment to any of the Sensitive plants. However, the project's Design Features are intended to minimize this risk and it is not expected that impacts to individual plants will result in measurable adverse impacts to Sensitive plant populations in the Bodie Hills. Furthermore it is expected that indirect benefits to sensitive plant habitats (discussed below) would mitigate any potential negative impacts to individual plants.

The Proposed Action treatments would indirectly benefit Sensitive plants or Sensitive plant habitats. Benefits would occur through reducing encroachment/infilling from other native plants into Sensitive plant habitat. Because many of the Sensitive plants that may be encountered in treatment units occur in sparsely vegetated openings that occur among more dense vegetation, disturbances such as fire, mowing or hand cutting would open up potential habitat and reduce competition from encroaching vegetation. Additionally low impact forms of habitat disturbance may stimulate plant reproduction.

It is expected that one of the primary effects of the proposed treatment would be the reduction of continuous high density fuel loads. In most ecological systems the treatment strategy is to work toward converting late seral vegetation classes to a more early seral class, and removal of trees from shrub habitat. Reducing high density fuel loads would maintain or improve the ecological condition by creating a more natural distribution of seral classes. Ecological systems with a more natural distribution of seral classes will be less likely to incur large scale high intensity wildfires. Because the Proposed Action treatments are expected to benefit the ecological systems as a whole, the proposed treatments are also expected to improve Sensitive plants habitat. This benefit would be achieved by reducing the potential for introduction or spread of cheatgrass or other invasive plants that may result from high intensity fires and/or reducing the likelihood of Sensitive plants being directly burned by high intensity fire.

Introducing disturbances such as fire or mowing into relatively intact systems would increase the potential for increases in annual grasses or other invasive plants that may adversely impact Sensitive plant habitat. Increases in annual grasses could lead to a decrease in available resources for Sensitive plants as well as an increased threat of wildfire which could adversely impact Sensitive plants. However the Methods, Method Selection Criteria and Design Features should minimize potential adverse effects. Overall direct effects to Sensitive plants are expected to be

minimal or none and indirect beneficial effects are expected to outweigh any adverse impacts because treatments would improve the overall condition of ecological systems that the majority of the Sensitive plants occur in.

*Cumulative Effects*

Cumulative effects to Sensitive plants are discussed in the No Action alternative of this issue and the cumulative effects of the Proposed Action are predicted to be similar to those discussed in the No Action Alternative.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The increased acreage alternative would treat approximately 14% (24,000 acres) of public land within the Bodie Hills over a 10 year period. Treatment acres would be increased in the Montane Sagebrush Steppe (~14,000 acres), Wyoming Big Sagebrush – loamy (~3,400 acres) and Low Sage (~3,000 acres) ecological systems compared to the Proposed Action alternative. The acres treated in Wyoming Big Sagebrush – loamy represent the largest increase in treatment acres compared to the Proposed Action alternative.

Due to the increase in treatment acres there would be increased likelihood of Sensitive plants occurring in treatment units, therefore there would be a slight increase in probability of affecting (positively or negatively) Sensitive plants. The same Methods, Method Selection Criteria and Design Features listed in the Proposed Action alternative would be followed therefore the increased acreage alternative would have similar effects on Sensitive plants as the Proposed Action.

Wyoming Big Sagebrush – loamy ecological system are one of the most susceptible to conversion to cheatgrass due to wildfire therefore the increased treatments are expected to indirectly benefit Sensitive plants occurring in that habitat or adjacent habitats by decreasing the likelihood of losing Sensitive plant habitat to cheatgrass infestations. However the increased disturbance and prescribed burning to control cheatgrass also increases the potential for increased invasion of cheatgrass. Following the Methods, Method Selection Criteria and Design Features should minimize this risk.

As described in Issues 1 – 3 and 5, by treating a larger percentage of acres of the project area, it is more likely that the long term effects would result in ecological systems with a more natural distribution of vegetation age classes which would benefit the ecological systems as a whole in the Bodie Hills and therefore would be more likely to also benefit Sensitive plant species and their habitat.

*Cumulative Effects*

Cumulative effects of the Increased Acreage Alternative are predicted to be similar to those cumulative effects discussed in Alternative 1 and 2. The main difference would be that because

more acreage is being treated, there is more likely to be a greater benefit to ecological systems in the Bodie Hills and the corresponding Sensitive plants that occupy those habitats.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The reduced acreage alternative would treat approximately 6% (10,000 acres) of the Proposed Action project area on public land within the Bodie Hills over a 10 year period.

Approximately half of the documented Sensitive plant occurrences in the Bodie Hills occur within the reduced acreage potential treatment area.

*C. quadricostata* makes up approximately 40% of the documented Sensitive plant occurrences that are within the Reduced Acreage Alternative project area, most of these occurrences are within Low Sage ecological sites which would incur approximately 750 acres of treatment. As indicated in the Proposed Action alternative, in the Low Sage ecological systems direct adverse impacts could easily avoided while the indirect effects of reducing competition from advancing vegetation expected to benefit *C. quadricostata* and other Sensitive plants occurring in the Low Sage ecological system.

Those Sensitive plant occurrences that fall within a treatment unit would be affected in a similar way as discussed in the Proposed Action alternative that are encountered in treatment units. However because fewer acres and a smaller area would be treated in the reduced acreage alternative compared to the Proposed Action alternative, the overall benefits to the ecological systems would be less, therefore it is likely that there would be fewer benefits to Sensitive plant species. The Reduced Acreage Alternative would be more beneficial to Sensitive plants than the No Action Alternative. However, it is still more likely that Sensitive plant occurrences would be adversely affected by direct loss of habitat caused by encroaching vegetation or the effects associated with higher intensity wildfires or increased wildfire frequency compared to the Proposed Action or Increased Acreage Alternative.

*Cumulative Effects*

Cumulative effects of the Reduced Acreage Alternative are predicted to be similar to those cumulative effects discussed in Alternative 1 and 2. The primary difference would be that because fewer acres would be treated, it is less likely to be as beneficial (compared to Alternative 2 or 3) to ecological systems in the Bodie Hills and the corresponding Sensitive plants that occupy those habitats.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

Alternative 5 would treat approximately 8% (~13,000 acres) of the Proposed Action project area on public land within the Bodie Hills project area over a 10 year period.

For Sensitive plants that occur outside the WSA, Alternative 5 would have very similar effects as those discussed in the Proposed Action.

For the Sensitive plants that occur within the WSA (approximately 35% of documented occurrences within the project area) the effects for some species may be different from those effects of described in the Proposed Action. Almost all of the known Sensitive plant occurrences within the WSA occur in the Low Sage ecological system. Because treatments within the WSA in the Low Sage ecological system would be very limited, the Sensitive plant occurrences in Low Sage within the WSA may be adversely (see discussion of potential adverse impacts in the no action alternative and the discussion of potential positive impacts in the Proposed Action alternative.

As mentioned above (alternative 4), treating less acres is less likely have lasting beneficial effects to the ecological systems as a whole, therefore the benefits to Sensitive plants are also likely to be less. However treating even a lesser amount of acres is likely to be more beneficial to Sensitive plants than not treating at all.

*Cumulative Effects*

Cumulative effects of the Broadcast Burning Only in WSA Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Alternative 6 would treat approximately 7% (~11,000 acres) of the Proposed Action project area on public land within the Bodie Hills project area over a 10 year period.

For Sensitive plants that occur outside the WSA, alternative 6 would have very similar effects as those discussed in the Proposed Action.

As noted above in alternative 5, approximately 35% of the documented Sensitive plants in the Proposed Action project area occur within WSA. For these occurrences the effects to Sensitive plants would be similar to those discussed in the No Action Alternative.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

***8. What are the potential effects of the project on the distribution and abundance of cheatgrass and other non-native invasive species and are the control measures included enough? What kinds of sites would be at risk of increases in non-native invasive species, especially cheatgrass?***

*Background*

Currently in the Bodie Hills, with exception of cheatgrass (*Bromus tectorum*), invasive plants are uncommon. The area has not been invaded by perennial pepperweed (*Lepidium latifoli*um) or other highly invasive perennial forbs that are common in other parts of the Great Basin. Although cheatgrass occurs in parts of the Bodie Hills it has yet to have broad scale ecological impacts to the area as it has in sagebrush steppe habitats elsewhere in the Great Basin.

Cheatgrass in the Bodie Hills is generally associated with south facing slopes, lower elevations, along roadsides and other previously disturbed sites but it can also be found in other site types throughout the Bodie Hills. The Rangeland Health Assessments conducted by the BLM between the years of 2001 – 2003 in grazing allotments throughout the project area documented cheatgrass cover ranging from 0% to 10% throughout most of the Bodie Hills. Since those Assessments, it is estimated that cheatgrass cover has gone up slightly in many portions of the project area. As indicated by information gathered from local land managers, it is believed that cheatgrass abundance in and around the project area is likely increasing (California Invasive Plant Council 2012). Increased abundance or coverage of cheatgrass cannot be attributed to a single factor but more likely a variety of actions or events, both anthropogenic and natural, including increases in atmospheric $CO_2$ levels associated with climate change. Models have predicted that deserts and other arid ecosystems, such as those found in the Bodie Hills, may be among the most responsive to increased or elevated levels of $CO_2$ in the atmosphere, this increase in $CO_2$ level could lead to more successful establishment of non-native annual grasses in arid environments (Melillo et al. 1993; Smith et al. 2000). Ziska et al. (2005) found that increased atmospheric $CO_2$ levels may already be responsible for increases in cheatgrass distribution and abundance; this may explain some of the increases observed in cheatgrass cover in the Bodie Hills.

One of the major threats of cheatgrass to the Bodie Hills is its ability to alter the fire regime and thereby change the vegetation types of Bodie Hills. Annual grasses such as cheatgrass are more flammable and can create more continuous fuel loads than perennial grasses and forbs; these conditions create an opportunity for larger and more frequent wildfires (Brooks et al. 2004). Once an area is burned, under certain conditions, the ground disturbance and increase in available resources (primarily due to the loss of vegetation), may lead to an increase in cheatgrass distribution and abundance (D'Antonio and Vitousek 1992; Davis, Grime et al. 2000; Chambers, Roundy et al. 2007;Chambers 2004; Whittaker, Roundy et al. 2008). This increase in cheatgrass can result in a "grass/fire cycle" where cheatgrass increases after wildfire and the increase of cheatgrass promotes more frequent wildfires (D'Antonio and Vitousek 1992; Brooks and Minnich 2006). Elsewhere in the Great Basin sagebrush steppe habitats that once had a natural fire return interval ranging from 30 to 100 years are now experiencing wildfire every 3 to 5 years due primarily to the presence of cheatgrass (Whisenant 1990). The increased frequency of fire promotes the dominance of cheatgrass and shifts an ecological system from one dominated by sagebrush and perennial grasses to one dominated by cheatgrass or other invasive plants (Brooks and Minnich 2006).

The invasibility of a site by cheatgrass is dependent on a variety of factors including the availability of surface and subsurface resources such as water and other nutrients as well as soil temperature (Davis, Grime et al. 2000; Chambers, Roundy et al. 2007; Chambers 2004, Whittaker, Roundy et al. 2008). The presence of and amount of perennial grasses is also an important factor in regards to both the invasibility of a site and the resilience of a site if it is invaded. In general, it is believed that in the Bodie Hills, lower elevation and south facing slopes are more likely to be invaded or experience increases in cheatgrass.

The following ecological systems or ecological conditions may be more (or less) susceptible to invasion or an increase in cheatgrass, although in practice it is nearly impossible to predict with 100% certainty whether cheatgrass will invade a site after a management treatment wildfire:

1. The Wyoming Sagebrush ecological systems. In the Bodie Hills the Wyoming sagebrush ecological systems are expected to be one of the most susceptible to cheatgrass invasion. Although the Wyoming Sagebrush-sandy ecological system is one of the most departed systems in the Bodie Hills it has not had as much of an increase in cheatgrass as some of the other areas in the Bodie Hills. This lack of increase in cheatgrass may be due to the sandy remnant Mono Lake shore deposits which seem to limit cheatgrass spread. However in the event of wildfire, it is expected that this system along with the Wyoming Sagebrush – loamy ecological system could be highly susceptible to cheatgrass invasion due the existing understory vegetation being depleted (Davies, Sheley et al. 2008; Whisenant 1990).
2. Large, late seral stands of Montane Sagebrush Steppe. The vegetation density and homogeneity associated with late seral classes creates a fuel load that may be capable of supporting large acreage, high intensity wildfire in this ecological system. Larger scale, high intensity wildfires could result in a positive feedback that favors the establishment of cheatgrass or other invasive plants (D'Antonio and Vitousek 1992, Brooks, D'Antonio et al. 2004; Brooks and Minnich 2006). Early and mid-seral vegetation tends to be more resistant to large fires because there are more interspaces between vegetation which limits the ability of fires to spread.
3. Sites which have greater "advanced stages" of pinyon encroachment (Baughman, Forbis et al. 2010). Because of the higher fuel loads associated with sites that have a higher density or percent cover of pinyon, these sites may be more susceptible to high intensity wildfires, as noted above large scale, high intensity wildfires could result in a positive feedback that favors the establishment of cheatgrass or other annual grasses. Additionally sites with a higher cover of pinyon frequently have a diminished presence of perennial grasses and other native herbaceous species in the understory which can make the site less resistant to cheatgrass invasion (see # 4 below).
4. Sites with little or no perennial grasses and/or native forbs in the understory (Baughman, Forbis et al. 2010). All of the above conditions (# 1 - 3) could have sites with depleted und erstories. When large amounts of trees or shrubs are removed (due to wildfire, prescribed fire, mechanical treatment, etc.) from sites with depleted understories there is an increase in resources (water, soil nitrogen, etc.) available for uptake by plants. Sites that have depleted understories may not have perennial grasses or native forbs that can quickly re-colonize; therefore the site is less resistant to invasion by cheatgrass.
   The presence of perennial grass is important to sites in their ability to resist invasion prior to a disturbance as well as after (Bates, Miller et al. 2005; Davies, Sheley et al. 2008).
5. Sites where cheatgrass is already present. Areas that are disturbed (vegetation removal due to wildfire, prescribed fire, mechanical treatments, etc.) where cheatgrass is present prior to the disturbance may be more likely to see further increase in cheatgrass cover and abundance.

*Alternative 1: No Action*

*Direct and Indirect Effects*

The No Action Alternative may result in direct and indirect effects on the distribution and abundance of invasive plants in the Bodie Hills. Direct effects would be limited to invasive plants or areas that are identified for treatment in the action Alternatives. Those invasive plants or ecological systems with infestations would not be treated as part of this project under the No Action Alternative. However, any existing infestations or infestations found in the future could be considered for treatment and analyzed in a separate NEPA document. The No Action Alternative may lead to less focused survey efforts for new infestations and therefore slower response time.

The No Action Alternative has the potential to have indirect effects on the distribution and abundance of invasive plants (such as cheatgrass) throughout the Bodie Hills. As discussed in Issues 1 – 3, the Bodie Hills has several ecological systems which are disproportionately comprised of late seral vegetation classes or vegetation classes that are uncharacteristic, and as mentioned above in the Background, these sites are more susceptible to invasion following fire or other disturbance. Because wildfire size, intensity and frequency may increase in the future (see Issue 5) it is predicted that the No Action Alternative may lead to a long term increase in distribution and abundance of cheatgrass in the Bodie Hills area.

Although the No Action Alternative removes the direct risk of treatment activities introducing new invasive plants or the indirect risk of facilitating cheatgrass expansion due to the disturbance associated with treatments, the No Action Alternative does not reduce the likelihood of large amounts of sagebrush habitat being converted to cheatgrass due to wildfire (see Background of this Issue). A distinct difference between a wildfire and a prescribed fire is that land managers have no choice in where or when a wildfire occurs. Additionally, managers also have less control of how much is burned in a wildfire. A wildfire may burn in areas that are particularly susceptible to cheatgrass invasion or at times or in circumstances that are more likely to favor cheatgrass establishment over native plant establishment. Wildfires that occur in mid to late summer occur after cheatgrass is dead and has dropped its seed, but during this time many native species are still growing and have yet to produce seed. Because of the timing of wildfires and the increased likelihood of them burning in dense fuels, wildfires are more likely to be larger and more intense. The timing of prescribed fires can be controlled so that fires burn with less intensity, therefore perennial grasses and forbs are less likely to be killed and can respond with favorable regrowth which helps reduce the opportunity for cheatgrass infestation (Ellsworth and Kauffman 2010).

It should be noted that just because a wildfire burns at high intensity and burns a large amount of acres, it does not guarantee that the area will become cheatgrass infested. The Indian Fire that burned in August of 2012 east of Mono Lake, thus far is an example. The Indian Fire was started by lighting and burned quickly, as was expected based on weather conditions and fuel type. The fire burned approximately 11,000 in 3 or 4 days' time. Vegetation was primarily comprised of mature, late seral montane sagebrush steppe. The majority of the burned area was free of cheatgrass and other invasive plants prior to the fire. Based on soil type and the lack of cheatgrass in the area prior to the fire, the BLM did not expect cheatgrass to be a major concern in the recovery of the area. Nearly two dozen monitoring plots at various elevations and aspects

throughout much of the burn have been visited to date (August 2013), thus far annual grasses have not been present in any of the plots. Based only on one growing season worth of observations, many of the higher elevation burn areas are responding with positive re-sprouting/growth of perennial grasses, rabbitbrush and several native forbs. Lower elevation sites have not seen as great of re-sprout of perennial grasses but cheatgrass is not present and native annual forbs are common.

While the No Action Alternative would, in the short term, maintain the Bodie Hills in the current condition of being relatively un-impacted by annual grasses and other invasive plants, the No Action Alternative is not expected to be a long term solution for enabling the ecological systems to be resistant to conversion to invasive plants. In the absence of thoughtful active management (i.e. creating fuel breaks in or around uncharacteristic ecological systems and creating mosaic of vegetation of different age classes) the Bodie Hills are at an increased risk of experiencing high severity wildfires such which may result in conversion to cheatgrass.

*Cumulative Effects*

The cumulative effects analysis area is the entire Bodie Hills landscape as described in Issue 1 and shown in Figure 6.

Potential cumulative impacts in the analysis area include climate change, development, fire suppression, livestock grazing, mining, recreation, vegetation management and wildfire. All past and current effects of these listed actions or events as well as any other action or events not mentioned above that could have introduced invasive plants or created disturbance that might have facilitated the spread of invasive plants in the analysis area have contributed to the current status of invasive plants within the analysis area. Therefore, the effects of these are reflected in the analysis of effects of the No Action Alternative.

Future actions or events that have potential to have cumulative effects to invasive plants when combined with any of the Alternatives include climate change and wildfire. These have the greatest potential for cumulative effects. Both climate change and wildfire are accounted for in the modeling of future conditions of the ecological systems in the Bodie Hills and are therefore reflected in the analysis of effects of the No Action Alternative. In summary, it is predicted that both climate change and wildfire could have an additive effect to abundance and distribution of invasive plants when combined with the No Action Alternative. Rising $CO_2$ levels associated with climate change are expected to favor cheatgrass spread and increasing wildfire frequency is also expected to lead to an increase in cheatgrass.

Other future actions or events that were considered that may have potential to have cumulative effects to Invasive plants when combined with any of the Alternatives include:
Development – Disturbance associated with development have cumulative effects on invasive plants when combined with the Alternatives, however at this time there are no large development plans so it is not reasonably foreseeable. Any potential smaller developments would be unlikely to cause a significant cumulative effect on invasive plants when combined with the Alternatives.

Livestock grazing – As noted in the cumulative effects analysis of Issue 7, historically grazing in the area was much higher than what present use is and what future use is expected to be,

therefore it is not expected that future grazing would be an added cumulative effect when combined with any of the Alternatives.

Mining – At this time, as discussed in Issue 1 mining is not reasonably foreseeable.

Recreation – although the Bodie Hills may be becoming a more popular recreation area the human use is still far less than when the area was actively mined. The majority of the current use is generally restricted to developed areas and established roads and routes therefore recreation is not expected to create enough new disturbances to be an additive cumulative effect to any of the Alternatives. There is potential for recreational activities to introduce new invasive plants to the area but the scale of this is not predicted to be a cumulative effect when combined with any of the Alternatives.

Vegetation treatments – Vegetation treatments are planned by some private land owners within the cumulative effects analysis area. At this time most of the planned projects focus on meadow vegetation which is not as susceptible to cheatgrass invasion as more upland sites. Some private treatments are planned for upland sites but due to the relative size them in comparison to the analysis area, the cumulative effects of these combined with the No Action Alternative are not expected to have a measurable effect on invasive plants.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action may have direct effects on the distribution and abundance of invasive plants in the project area. Invasive plant treatments that may occur as part of the Proposed Action would result in an immediate decrease of invasive plants in those areas. A reduction of invasive plants is expected to benefit the native species by decreasing competition for resources.

Equipment brought into the project area and movement of personnel or equipment within the project area could result in the introduction or spread of invasive plants. The introduction or spread of an invasive species within the project could result in adverse effects to the native plant community and the affected ecological system. Project design features would minimize the potential for introduction and spread of invasive plants.

The Proposed Action may result in indirect effects that could be both beneficial and/or adverse in regards to the distribution and abundance of invasive plants in the project area. All of the proposed treatment methods have some degree of potential of increasing the abundance or distribution of invasive plants. Treatments such as the removal of vegetation or burning of piles would result in an increase in available resources or change in soil properties which could lead to the increased invasibility of a site (Ross, Castle et al. 2012; Whittaker,Roundy et al. 2008; Chambers, Roundy et al. 2007). For example, Ross et al. (2012) observed rings of cheatgrass within pile burn area. Davies, Bates et al. (2012b) documented that mowing Wyoming sagebrush stands with degraded understories resulted in an increase in cheatgrass or other non-natives. As discussed in the *Background* section of this Issue, the presence of cheatgrass can alter the fire regime and thereby change the vegetation type of an area from one dominated by shrubs to one dominated by annual grasses.

However, the treatment method of each proposed treatment unit would be based on the conditions of that site. For each proposed treatment unit the BLM would go through the *Method Selection Criteria* in order to select (when there is a choice) the most effective method to get the desired results without risking an adverse (i.e. cheatgrass) outcome. Project *Design Features* (including pre-treatment invasive plant surveys, post treatment surveys and monitoring as well as Adaptive Management) would be followed. In general, the Proposed Action would target areas that are less susceptible to cheatgrass invasion and treatments would be conducted in a manner that would reduce the likelihood for increasing invasive plant distribution or spread. For example, treatment areas would generally avoid areas with higher densities of pinyon as well as areas that are already infested with cheatgrass.

Research has found that treatments in areas where pinyon/juniper cover is low and the herbaceous understory is still intact or treatment in Montane Sagebrush Steppe where native understory species are present can result in an increase of native grasses or forbs without significant increases in cheatgrass or other invasive plants (Baughman et al. 2010, Ellsworth et al. 2010). Davies et al. (2012c) found that mowing Montane Sagebrush Steppe resulted in an increase in native grasses and native annual forbs but did not promote an increase in non-native annual grasses. In regards to potential treatments, sites that may be classified as late-open (see appendix B, Ecological System Descriptions) may still be up to 30% perennial grass cover. This is of note due to the importance perennial grasses play in recovery after disturbance. Research conducted in conjunction with the Rancheria Gulch pinyon thinning treatments in the Bodie Hills found that perennial grass cover increased following thinning treatments and greater increases occurred when there was a lower percentage of pre-treatment pinyon cover (Matchett et al. 2010). The same study also found that cheatgrass abundance varied greatly among plots, with some plots having a high abundance. But overall, there were no statistically significant effects on cover in regards to cheatgrass (Matchett et al. 2010). Additionally, as indicated in the *Design Features*, sites would be monitored following treatments to assess if there was an increase in invasive plants.

In the Wyoming sagebrush – loamy and Wyoming sagebrush – sandy ecological systems, which are more prone to invasion or increases of cheatgrass, the treatments will be limited primarily to creating fuel breaks. As noted above, mowing Wyoming sagebrush may lead to an increase in cheatgrass. However the mowing of Wyoming sagebrush associated with the Proposed Action represents less than 5% of the proposed treatment acres and less than 1% of the project area. The BLM feels that the fuel breaks would be beneficial by helping protect other areas from wildfire.

The purpose of the Proposed Action is to improve the ecological condition and resiliency of ecological systems in the Bodie Hills. The project would create patches of vegetation at different age classes which is expected to make the area less susceptible to large, high intensity wildfires. Earlier seral vegetation is less likely to carry fire (compared to late seral) because it has more open ground between shrubs and lower fuel loading. Lowering the chance of wildfires burning vast acres of land makes the landscape more resistant to invasion by cheatgrass. Treatments in many areas are expected to increase perennial grasses (Baughman et al. 2010; Ellsworth et al. 2010; Davies et al. 2012c). Increasing the amount of perennial grass will help make sites more resistant to invasion by non-native.

The Proposed Action is designed to minimize the potential of the project increasing cheatgrass or other invasive plants. However there is still potential that actions associated with the Proposed Action could increase invasive plants at localized sites. But overall, the Proposed Action is expected to be beneficial compared to No Action by improving the ecological systems in the long term and making the project area as whole more resistant to conversion to invasive plants.

*Cumulative Effects*

As indicated in the No Action Alternative, past and current actions and events or reflected in the current condition and therefore analyzed in the Direct and Indirect Effects of the No Action Alternative.

Future cumulative effects are predicted to be similar to those discussed in the No Action Alternative with the exception of climate change and wildfire. Modeling of future conditions considered increased wildfire activity so it was therefore considered in the Direct and Indirect Effects analysis of the Proposed Action. To summarize, it is predicted that the Proposed Action will lessen some the negative effects of climate change and future wildfires on the spread of invasive plants.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Overall the Increased Acreage alternative is expected to have relatively similar results as those described in the Proposed Action alternative because the treatment Methods, Methods Selection Criteria and Design Features would be the same.

Treating more acres may lead to increased likelihood of spreading or introducing invasive plants, but as with the Proposed Action, Project Design Features would minimize this potential.

Some of the greater increase in treatment acres would occur in the Wyoming Sagebrush – loamy ecological system. Because this is one of the systems that is most vulnerable to cheatgrass invasion in the event of a wildfire, increased treatments are expected to reduce the potential of cheatgrass or other invasive plant infestation by reducing the potential of a large wildfire.

As described in Issues 1 – 3 and 5, treating more acres is more likely to improve the long term trajectory of ecological systems in the Bodie Hills. This improvement is expected to reduce the potential for invasive plant spread and abundance by making the ecological systems more resilient to natural disturbances. This would be realized through a greater variety of age classes among ecological systems and stimulation of native understory growth that would replenish areas that are depleted. For these reasons, it is expected that in the long term, the Increased Acreage alternative would be very similar to the Proposed Action if not more beneficial in terms of reducing the potential for Invasive plant abundance and spread.

*Cumulative Effects*

Cumulative effects of the Increased Acreage Alternative are predicted to be similar to those cumulative effects discussed in Alternative 1 and 2. The primary difference would be that because more acreage is being treated, it is more likely there would be a greater benefit to

ecological systems in the Bodie Hills and therefore it is predicted this will make the area more resistant to invasion by invasive plants.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The effects of the Reduced Acreage Alternative would be reduced but overall similar to those of Proposed Action because the treatment Methods, Methods Selection Criteria and Design Features would be the same.

As described in Issues 1 – 3 and 5, because the Reduced Acreage alternative would treat fewer acres, it is not as likely to have as much effect on the ecological systems in the long term compared to the Proposed Action or Increased Acreage alternative. Because of this, the Bodie Hills would be more at risk of future increase of invasive plant distribution and abundance when compared to the Proposed Action and Increased Acreage alternative. However the Reduced Acreage alternative would be more beneficial in preventing invasive plant spread than the No Action alternative.

The Reduced Acreage alternative would however treat the same amount of acres as the Proposed Action Alternative in the Wyoming Sagebrush – loamy ecological type. This is important because this ecological type is one of the most susceptible to invasion by cheatgrass.

The treatment in the Montane Sagebrush Steppe ecological type would be reduced by approximately 40% from the Proposed Action. Therefore only about 6,500 acres of the nearly 100,000 acres of mid to late seral or uncharacteristic classes of Montane Sagebrush Steppe that currently exist in the Bodie Hills would be treated. Although creating even small amounts of heterogeneity in these late seral stands would improve the resilience of the ecological system to wildfire induced cheatgrass spread, this change would be less than what is needed to protect this large ecological system from future increases in cheatgrass.

*Cumulative Effects*

Cumulative effects of the Reduced Acreage Alternative are predicted to be similar to those cumulative effects discussed in Alternatives 1 and 2. However, because fewer acres are treated there would be less benefit to the ecological systems; therefore they may be more vulnerable to invasive plants.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

Overall Alternative 5 is expected to have similar results as those described in the Proposed Action alternative. Treatment Methods, Methods Selection Criteria and Design Features would remain the same as those of the Proposed Action except prescribed burning or spot burning would be the only treatment that would occur in WSA's.

As with the Reduced Acreage alternative, because fewer acres are being treated there may be a decreased probability of negative effects. However, because fewer acres are planned for treatment when compared to the Proposed Action or Increased Acreage Alternatives, the long term benefits associated with greater amounts of treatment would not be as great.

*Cumulative Effects*

Cumulative effects of the Limited Treatment in WSA Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Outside of WSAs, Alternative 6 would have very similar results to those discussed in the Proposed Action Alternative. Within WSAs the effects would be similar to those discussed in the No Action Alternative. Overall however, as noted with the other alternatives that would treat fewer acres, the long term benefits associated with larger treatments would not be as great. Those areas within the WSA would be more vulnerable to large wildfires which could lead to an increased presence of invasive plants.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

***9. How does vegetation recovery after pinyon removal depend on the pre-treatment cover?***

*Background*

The pre-treatment cover of pinyon and juniper can be an indicator of how vegetation will respond to treatments. In general, the higher the pre-treatment cover of pinyon/juniper is, the less vigorous the response of native grasses and forbs is following treatment (Chambers 2004; Matchett et al. 2010). This correlation is most likely a result of the decrease in herbaceous understory that occurs as pinyon or juniper cover increases (Allen Nowak 2008; Chambers 2007,; Miller et al. 2000). Therefore treating pinyon and juniper stands before they reach late-mid or late successional phases (greater than approximately 30-40% canopy cover) will generally result in better post-treatment recovery (Miller et al. 2008).

Although pre-treatment pinyon/juniper covers can be a good predictor of post-treatment response, there are other factors that can influence the speed and composition of the vegetative response. These factors include but are not limited to; the site characteristics, weather, post treatment management (Bates et al. 2005), and treatment method and timing (Bates, Svejcar 2009). Chambers (2012) observed that a community's resilience to treatments generally goes down as tree cover goes up. However, a community's resistance to cheatgrass invasion is dependent on soil temperature and ecological site type (Chambers 2012). See Issue 8 about invasive plants for more information on sites that are susceptible to invasion by cheatgrass.

*Alternative 1: No Action*

*Direct and Indirect Effects*

The No Action Alternative would result in no direct effects to vegetation because no programmatic vegetation restoration program would be implemented. However, as discussed in previous Issues, it is likely that there would be indirect effects to vegetation under the No Action Alternative.

General effects to vegetation are expected to be similar to those discussed in Issues 1 – 3 and 6 - 11 and the general Vegetation section. Most importantly, it is expected that under the No Action Alternative, the current trend of increasing shrub and pinyon/juniper density as well as pinyon/juniper infilling would continue unless affected by wildfire or some other form of landform disturbance (Miller et al. 2008). As noted in the Background section of this Issue, it has generally been observed that as pinyon/juniper (and shrub) cover increases, the productivity of the understory (perennial grasses, forbs and native annuals) decreases. One of the primary risks associated with an increasing density of trees and shrubs and a decreasing herbaceous understory, is the risk of crossing an ecological threshold. Once an ecological threshold has been crossed the ecosystem may not be able to return to the original condition on its own and treatments will be more costly and less likely result in regrowth of desirable vegetation (Chambers 2012; Chambers 2004; Miller et al. 2005; Miller et al. 2000).

*Cumulative Effects*

The cumulative effects analysis area is the entire Bodie Hills landscape as described in Issue 1 and shown in Figure 6. See the Cumulative Effects analysis in Issue 1, 7, 8 (NRV, Sensitive Plants, Invasive Plants) for a discussion of the Cumulative Effects to sensitive plants and invasive plants. Cumulative effects to vegetation are expected to be similar to those analyzed in those Issues.

Wildfire suppression/fire management, climate change and wildfire are expected to be the actions or events that are most likely to have had or that will have a cumulative effect when combined with the No Action Alternative. As discussed in in Issue 7 and 8 these actions/events have contributed to the current condition and therefore are reflected in the analysis of the No Action Alternative.

Future wildfire suppression would likely contribute to an increase in pinyon/juniper and shrub cover. As pinyon/juniper cover moves closer to or into Phase III (late successional; greater than approximately 50% cover of pinyon or juniper) an ecological threshold may be crossed and the risk of large wildfire and conversion to cheatgrass or invasive species is more likely (Miller et al. 2008).

As noted in other Issues (1, 7, 8) climate change and wildfire were factored into the modeling of future conditions and therefore have been accounted for in the Direct and Indirect Effects analysis.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

Vegetation treatments such as cutting would result in mortality to targeted trees. Mowing would result in a reduction in cover of targeted shrubs; some shrubs may re-sprout following mowing. Prescribed fire would likely result in mortality to pinyon/juniper and shrubs such as sagebrush and bitterbrush (these shrubs are more likely to re-sprout following low intensity burns such as those that might encountered during prescribed fires). Perennial grasses are more resistant to fire and are generally not negatively impacted by cutting or mowing treatments.

As mentioned in the Background section of this Issue, research conducted within burned (prescribed and wildfire) areas and pinyon and juniper mechanical treatment projects throughout the Great Basin have documented the general trend of decreased response of native vegetation with increasing pinyon/juniper cover. However, sites with early to mid pinyon or juniper development, with little or no cheatgrass and an adequate native perennial grass component will generally respond favorably following treatment (Baughman et al. 2010; Miller et al. 2000; Miller et al. 2008). Bates et al. (2005) observed juniper stands that had 2 – 3 perennial grasses per $m^2$ were sufficient to permit natural recovery.

The response of vegetation following treatment of pinyon and juniper would also be affected by other factors such as vegetation type, treatment method and treatment timing. Research (Chambers 2012) has found that mountain big sagebrush communities (Montane Sagebrush Steppe Ecological System) generally respond more favorable following treatment due their tendency to be higher in elevation and the greater availability of moisture. The Montane Sagebrush Steppe Ecological System is expected to have an increase in perennial grass cover and density following pinyon/juniper treatments. Native annual plants and perennial forbs are also expected to increase following treatment. However the response of perennial forbs is less predictable. Non-native annual grasses such as cheatgrass may also increase following treatment. Although some sites may have an initial increase in cheatgrass following treatment, depending on treatment site and method, this increase may only last a few years until perennial grasses become better established and outcompete cheatgrass (Bates, Svejcar 2009).

The Wyoming Sagebrush ecological systems tend to be lower in elevation and drier than the Montane Sagebrush Steppe ecological system, in general these sites tend to have a less diverse and less dense understory of perennial grasses and forbs. For these reasons the Wyoming Sagebrush ecological system tends to have a less productive response following treatment and as indicated in Issue 8 (Invasive Plants) are more susceptible to invasive plants following disturbance.

It is expected that treatments may result in a short term decrease in plant cover and a potential increase in invasive plants such as cheatgrass. The Proposed Action would generally apply treatments in areas that are Phase I or II (less than 50% cover) pinyon/juniper stands. Additionally, areas where treatment would occur would favor sites that would lead to a more favorable response following treatment (see Methods Selection Criteria and Design Features of the Proposed Action). Therefore, following the Project Methods, Method Selection Criteria and Design Features as well as using adaptive management, the Proposed Action is expected to increase both annual and perennial native herbaceous cover and density, as has been observed in similar projects throughout the Great Basin (Cook et al. 1994; Bates, Svejcar 2009; Bates et al. 2005; Davies et al. 2008; Matchett et al. 2010). This vegetative response is expected to be beneficial to the ecological systems of the Bodie Hills by making them more resilient to potential adverse effects of wildfire, climate change and other potential landscape disturbances.

*Cumulative Effects*

Cumulative Effects of the Proposed Action are expected to be similar to those discussed in the No Action Alternative of this Issue. The primary difference would be that the Proposed Action would reduce the potential of adverse cumulative effects of future wildfires. Having a greater

mosaic of vegetation of different age classes, including those classes dominated by perennial grasses would allow for a greater resilience to potential adverse cumulative effects of wildfire.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The direct and indirect effects of the Increased Acreage Alternative are expected to be the same as those discussed in the Proposed Action of this Issue because the same Project Methods, Method Selection Criteria and Design Features would be followed.

*Cumulative Effects*

Cumulative effects would be similar to those discussed in the No Action and Proposed Action of this Issue. The only difference would be that because more acres would be treated, it is expected that there would an overall slightly greater resilience to potential adverse cumulative effects associated with wildfire than those of the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The direct and indirect effects of the Reduced Acreage Alternative are expected to be the same as those disused in the Proposed Action of this Issue because the same Project Methods, Method Selection Criteria and Design Features would be followed.

*Cumulative Effects*

Cumulative effects would be similar to those discussed in the No Action and Proposed Action of this Issue. However because fewer acres would be treated, it is expected that the project would result in slightly less resilience to potential adverse cumulative effects associated with wildfire than those of the Proposed Action.

*Alternative 5: Limited Treatment in WSAs*

*Direct, Indirect and Cumulative Effects*

It is expected that Direct, Indirect and Cumulative Effects of Limited Treatment in WSAs Alternative would be essentially the same as those discussed in Proposed Action because a very similar amount of acres would be treated and the same Project Methods, Method Selection Criteria and Design Features would be followed.

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Outside of WSA's, alternative 6 would have very similar results to those discussed in the Proposed Action Alternative.

Within WSA's the effects would be similar to those discussed in the No Action Alternative.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

***10. What will the effects of burning be on the soil and vegetation regrowth?***

*Background*
Fire, depending on the intensity, can change the properties of soil. Intense fires can lead to soil hydrophobicity. Hydrophobicity occurs when minerals within the soil become coated with a layer of organic material which decreases the ability of the soil surface to absorb water (Erickson, White 2008). Fires can also cause destabilization of the soil surface due to combustion de-stabilizing organic materials, as well as loss of vegetation (Ross et al 2012). Fires can also cause a blackening of the soil surface and an increase in soil temperature due to the loss of vegetation cover and darkening of the surface. Overall the effect of fire on soils is generally closely tied to how severe a fire is (Erickson, White 2008).

Fire can lead to alterations in soil nutrients and as a result, change the type and quantity of vegetation regrowth. The loss of vegetation associated with fire generally leads to an increase in soil water availability, as well as an increase in soil nutrients including nitrogen (Chambers 2004; Chambers et al. 2007; Rau et al. 2008). This increase in soil water availability and nutrients can in turn affect the vegetation regrowth. As noted in the Invasive Issue (Issue 8), studies have found that these increases can lead to an increase in vegetation regrowth (regrowth may be either native or non-native species). Davies et al. (2008) noted that in Wyoming sagebrush – bunchgrass communities, prescribed fires created an initial increase in available resources which could decrease the communities' resistance to invasive plant infestation. However, if there are no invasive plants there to become established, that the prescribed burning can ultimately increase a communities resistance to infestation. Other research found that burning can have positive impacts on vegetation resulting in increased plant biomass and nutrients (Rau et al. 2008).

*Alternative 1: No Action*

*Direct and Indirect Effects*
The No Action Alternative would have no direct effects on soil or vegetation regrowth. However as noted elsewhere in this document it is expected that wildfire activity and intensity will increase in the future. The existing condition of large, continuous stands of late seral dominated vegetation are more likely to be susceptible to wildfire of increased size and intensity. As noted above in the background section of this Issue, fires with a greater intensity are more likely to cause adverse impacts to the soil and are more likely to result in infestation of cheatgrass (Issue 8). Therefore, although the No Action Alternative would have no direct impact on soils due to prescribed burning, the No Action May lead to larger more intense wildfires which are more likely to adversely affect soils and vegetation regrowth.

*Cumulative Effects*
Potential cumulative impacts in the analysis area include climate change, fire suppression, vegetation management and wildfire. All past and current effects of these listed actions or events as well as any other action or event not mentioned above have contributed to the current condition within the analysis area; therefore the effects of these potential cumulative impacts are reflected in the analysis of effects of the No Action Alternative.

Future actions or events that have potential to have cumulative effects when combined with any of the Alternatives include climate change and wildfire. Both climate change and wildfire are accounted for in the modeling of future conditions of the ecological systems in the Bodie Hills and are therefore reflected in the analysis of effects of the No Action Alternative. In summary, it is believed that future wildfire size and intensity will increase which is likely to contribute to adverse impacts to soil and the corresponding vegetation regrowth.

It is predicted that both climate change and wildfire could have an additive effect on soils and vegetation regrowth when combined with the No Action Alternative.

Other future actions or events that were considered that may have potential to have cumulative effects when combined with any of the Alternatives include:
Vegetation treatments – Vegetation treatments are planned by some private land owners within the cumulative effects analysis area. At this time most of the planned projects are relatively small and isolated in comparison to the analysis area, the cumulative effects of these combined with the No Action Alternative are not expected to have a measurable effect on soils and vegetation regrowth.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action may have short term (generally less than 3 years) effects on soil. Rau et al. (2008) observed increased soil nitrogen and metal cations immediately after and up to approximately a year following prescribed fire treatments. Rau et al. also found corresponding effects on the vegetation regrowth; most vegetation that regrew in prescribed burn plots had increased above ground plant weight and tissue Nitrogen concentrations (2008).

Other research in the Great Basin on the effects of prescribed fire on vegetation regrowth have had similar findings; following fire there is increase in soil water availability and soil nutrients, this generally leads to increased vegetative production which may come in the form of native or non-native species or both (Board et al. 2011; Davis et al. 2000; Chambers 2004; Chambers et al. 2007; Cook et al. 1994). Whether a site becomes infested by cheatgrass or some other invasive is closely tied to the preexisting site conditions as well conditions following the fire (Issue 8). Researchers (Cook et al. 1994; Davies et al. 2008) concluded that the increase in resource availability following prescribed fire benefits native species and the plant community, if invasive plants such as cheatgrass are not present prior to the fire or introduced immediately following the fire.

Pile burning is likely to result in greater temperatures than those that occur during broadcast prescribed burning due the density of the fuel load. The high temperatures that may occur could lead to destabilization of the soils in these areas as well an increased susceptibility to cheatgrass invasion in these area (Ross et al. 2012). Ross et al. cited cases where adding mulch to these sites helped reduce cheatgrass abundance as well helped to stabilize the soil (2012).

A key difference in the effect of prescribed fire on soil and vegetation regrowth compared to wildfire fire is the fire intensity. Prescribed fire generally occurs in cooler seasons compared to when wildfires may occur. Prescribed fires can also be timed to occur when there is less

vegetation present and plants are moister (winter, spring or early summer), compared to wildfires which generally occur when temperatures and soils are hotter and vegetation is drier (late summer or fall). These differences generally mean that prescribed fires will have less impact to soil and perennial vegetation (Bates, Svejcar 2009). Overall it is expected that by following project Design Features and using Adaptive Management, that prescribed burning will improve the ecological condition and result in plant communities that are more resilient to future invasive plant infestations.

*Cumulative Effects*

Cumulative Effects of the Proposed Action are expected to be similar to those discussed in the No Action Alternative of this Issue. The primary difference would be that the Proposed Action would reduce the potential of adverse cumulative effects of future wildfires. Having a greater mosaic of vegetation of different age classes, including those classes dominated by perennial grasses would allow for a greater resilience to potential adverse cumulative effects of wildfire.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The direct and indirect effects of the Increased Acreage Alternative are expected to be the same as those discussed in the Proposed Action of this Issue because the same Project Methods, Method Selection Criteria and Design Features would be followed.

*Cumulative Effects*

Cumulative effects would be similar to those discussed in the No Action and Proposed Action of this Issue. The only difference would be that because more acres would be treated, it is expected that there would an overall slightly greater resilience to potential adverse cumulative effects associated with wildfire than those of the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The direct and indirect effects of the Reduced Acreage Alternative are expected to be the same as those disused in the Proposed Action of this Issue because the same Project *Methods*, *Method Selection Criteria* and *Design Features* would be followed.

*Cumulative Effects*

Cumulative effects would be similar to those discussed in the No Action and Proposed Action of this Issue. However because fewer acres would be treated, it is expected that the project would result in slightly less resilience to potential adverse cumulative effects associated with wildfire than those of the Proposed Action.

*Alternative 5: Limited Treatment in WSAs*

*Direct, Indirect, and Cumulative Effects*

It is expected that Direct, Indirect and Cumulative Effects of Limited Treatment in WSAs Alternative would be essentially the same as those discussed in Proposed Action because a very similar amount of acres would be treated and the same Project Methods, Method Selection Criteria and Design Features would be followed.

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Outside of WSA's, alternative 6 would have very similar results to those discussed in the Proposed Action Alternative.

Within WSA's the effects would be similar to those discussed in the No Action Alternative.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

***11. What will the effects of pile burning be on the remaining pinyon pine trees?***

*Background*

This issue addresses concerns that were raised in regards to pinyon thinning treatments conducted in the Rancheria Gulch area of the Bodie Hills where untreated or "leave" trees were scorched during the pile burning process. Treatments that were conducted as part of the Rancheria Gulch project have differences from the treatments considered for this current project. The project design of the Rancheria Gulch treatments called for leaving (not cutting) 20 trees in each treatment plot. Additionally, thinning and pile burning treatments occurred in plots with up to 80% pre-treatment pinyon cover. Cut, pile, burn treatments considered in the current project would generally cut all pinyon trees within a treatment zone unless trees occurred in true pinyon woodland or there was some other specific reason for not cutting a tree (wildlife habitat, culturally sensitive area, etc.). In addition, treatments that may occur as part of this project would generally not treat areas that have as high of pre-treatment cover of pinyon as some of the treatment plots in the Rancheria Gulch project. Because the Rancheria Gulch treatment plots had "leave" trees and plots may have had a high pinyon density, piles may have been placed closer together and closer to "leave" trees due to an increased amount of material generated by the treatment.

*Alternative 1: No Action*

*Direct and Indirect Effects*

The No Action Alternative would result in no direct effects associated with pile burning or spot burning because treatments associated with this project would not occur. Indirect effects to pinyon that may result from the No Action Alternative include increased likelihood of scorching or complete mortality of pinyon due to increased wildfire activity (see Issue 5). In the absence of treatments, the late seral and uncharacteristic vegetation may promote wildfires capable of burning pinyon trees and other vegetation.

*Cumulative Effects*

See the Cumulative Effects of the No Action Alternative of Issues 1 – 3 for a description of the analysis area.

Potential cumulative effects of the No Action alternative include such past and present actions as grazing, mining, wildfire suppression and vegetation treatments as well as wildfire and climate change. As discussed in Issues 1 – 3, these actions are reflected in the current conditions and

were considered in the effects of the No Action Alternative therefore there are no cumulative effects of the No Action Alternative. Future mining and grazing may contribute to cumulative effects but as disused in Issue 1 these were ruled out. Some future vegetation management treatments are planned for private lands but the scale of these in context to the analysis area is not expected to be an additive cumulative effect to the No Action Alternative on the effects to pinyon trees.

Past and current actions such grazing, mining, climate change, wildfire, fire suppression and vegetation treatments are reflected in the current condition within the analysis area, therefore the No Action Alternative has no cumulative effects separate from those effects considered in the analysis of effects the No Action Alternative.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action may result in scorching and other direct and indirect impacts to trees surrounding the areas where spot or pile burning occurs. The Methods and Method Selection Criteria would reduce the potential for scorching adjacent trees, e.g.; piles would be constructed at least 10 feet from any remaining tree and piles would be no greater than 5 feet high and 10 feet in diameter when they are burned (these distances may be increased on steep slopes).

It is expected that scorching of remaining trees could generally be avoided, but in the event that adjacent trees are impacted by spot or pile burning, direct effects include browning or blackening of needles, branches and trunks or the complete mortality of trees in severe cases. Trees that are scorched less severely will generally drop the scorched needles within a couple years, limbs may also die and eventually breakoff but the tree itself may continue to grow and produce buds and seed. Although it is not the intent of the Proposed Action to scorch trees that are intentionally left standing, scorching could be beneficial because it simulates a low intensity ground fire by removing lower tree limbs that may act as latter fuels that could contribute to crown fires.

The Proposed Action would not target true pinyon woodlands for treatment and would generally avoid treating areas with dense tree cover. Because of this and the Project Methods and Method Selection Criteria, the potential for directly affecting adjacent trees during pile burning would be greatly reduced. However if the surrounding trees are burned, there may be impacts to individual trees but overall the pinyon population within the project area would not be affected or would be affected only minimally.

*Cumulative Effects*

See the Cumulative Effects of the No Action Alternative of this Issue and Issue 1 for a description of the analysis area and potential past, current and future actions that might have a cumulative effect when combined with the alternatives. Overall, any other potential future action not considered here is not expected to have a cumulative effect in conjunction with this alternative because the potential impacts to pinyon adjacent to pile burn areas are expected to be minimal or none.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The effects of the Increased Acreage Alternative are generally expected to be similar to those discussed in the Proposed Action Alternative. However because the Increased Acreage Alternative would increase the amount of pile or spot burning that could occur (approximately 5,500 acres in the Proposed Action and approximately 6,800 acres in the Increased Acreage Alternative), there is a corresponding increase in chance of scorching trees adjacent to piles. The Methods and Method Selection Criteria would remain the same as those of the Proposed Action so it still expected that direct effects would be minimal.

Because the Increased Acreage Alternative treats more acres, it is expected to result in a greater distribution of vegetation age class and a greater decrease in the amount of uncharacteristic vegetation in some ecological systems (See Issue 1). Therefore the likelihood of scorching or mortality to pinyon due to wildfire is likely to decrease compared to both the No Action and Proposed Action Alternative (see Issue 5).

*Cumulative Effects*

The cumulative effects of the Increased Acreage Alternative are expected to be the same as those of the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

Similar to the reasoning in the analysis of the Increased Acreage Alternative, because less pile or spot burning would be done (approximately 3,200 acres), it is expected that the chance of scorching or mortality to leave trees would be less than either the Proposed Action or the Increased Acreage Alternative.

Because less acres treated is likely to result in less of an overall effect on the distribution of vegetation age class and the amount of uncharacteristic vegetation in some ecological systems, the likelihood of scorching or mortality of pinyon due to wildfire may increase compared to the Proposed or Increased Acreage Alternative.

*Cumulative Effects*

See the Proposed Action for cumulative effects of the Reduced Acreage Alternative.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

The amount of potential pile or spot burning that would be done is approximately 4,200 acres therefore the potential of scorching is expected to be less than that of Proposed Action but more than that of the Reduced Acreage Alternative.

*Cumulative Effects*

See the Proposed Action for cumulative effects of the Reduced Acreage Alternative.

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Outside of WSA's, alternative 6 would have very similar results to those discussed in the Proposed Action Alternative. Within WSA's, the effects would be similar to those discussed in the No Action Alternative; pinyon trees would not be scorched due to pile burning or treatments but trees may be more vulnerable to scorching or burning from wildfire activity.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

## Wildlife:

***12. What will the project effects be on wildlife populations especially sage-grouse, mule deer migration, pika, and pygmy rabbit? (Includes effects of altering cover of sagebrush and pinyon, treatments within 2 miles of leks, the use of prescribed fire, and implementation disturbance.)***

***13. How will treatment of late successional habitats affect species that use them? (see also effects to pinyon ecological services).***

***14. What will be the cumulative effect of the project combined with the hunting of sage-grouse authorized by CA DFG?***

The following analysis addresses all three of the issues listed above because they are all related and best analyzed together.

*Background*

Greater sage-grouse (*Centrocercus urophasianus*) and pygmy rabbit (*Brachylagus idahoensis*), BLM sensitive wildlife species, are known to occur within the project area. In 2012, the Bi-State distinct population segment (DPS) of greater sage-grouse specifically was designated as a BLM sensitive species (USDI BLM 2012a). No other BLM sensitive wildlife species are known to occur in the project area based on historical records, field monitoring, and/or habitat suitability.

The Bishop Field Office completed informal conferencing for this project with regard to the Bi-State DPS with the USDI Fish and Wildlife Service (FWS) in 2014 (USDI FWS 2014). In their Conference Report, the FWS state that they "support the BLM's plan to conduct habitat improvement projects within the Bodie Hills identified in the CA [Conservation Assessment]. The proposed action is designed to reduce sage-grouse impacts from any detectable or measurable disturbance by restricting the type, location, scale and timing of treatments." Additional analysis with regard to the greater sage-grouse may be found in the Conservation Assessment (USDI BLM 2014a).

**Greater Sage-grouse**

***Status***

The US Fish and Wildlife Service (USDI FWS) have determined that greater sage-grouse in the Bodie Hills are part of a distinct population segment (DPS) (USDI FWS 2010b). This is based on evidence that the populations in Mono County, California and adjacent counties of Nevada are genetically distinct from greater sage-grouse elsewhere (Benedict et al. 2003, Oyler-McCance et al. 2005, USDI FWS 2010b). This DPS, called the Bi-State population, was given a higher

priority for listing than the greater sage-grouse range wide primarily due to the relatively small and isolated nature of this population and the magnitude and immediacy of habitat based threats facing the DPS (USDI FWS 2010b). On October 28, 2013 the FWS proposed to list the DPS as threatened under the Endangered Species Act and at that same time proposed to designate approximately 1.8 million acres of critical habitat (USDI FWS 2013 b and c). Threats to the DPS include habitat loss caused by conifer expansion, wildfire, development, grazing and invasive species (USDI FWS 2013b, c and d). It is expected that the FWS will publish a final rule with a determination of the federal status under the ESA for the Bi-State DPS in April of 2015.The potential effects from the action alternatives would not be altered by a change in the status of the species related to the FWS proposed rule. The proposed project looks at habitat for the grouse at a landscape level and the conclusions reached would be relevant regardless of the federal status

A conservation plan for Bi-State area was created in 2004 (NDOW 2004). This plan recognizes the Bodie area as one of several Population Management Units (PMUs). In 2012, a new plan was created to summarize accomplishments related to the 2004 plan and strategize future conservation efforts (Bi-State Technical Advisory Committee 2012a).

***Population***

The project area is in the Bodie PMU, which includes one of the largest breeding complexes in the Bi-State DPS (USDI FWS 2013b). Sage-grouse population trends in the Bodie PMU as indicated by annual lek (strutting ground) censuses are characterized by frequent fluctuations (NDOW 2004). The highest numbers were recorded during the early 1960s, the early 1990s, and present day (NDOW 2004, Bi-State Technical Advisory Committee 2012a). The lowest numbers were recorded during the mid-1950s, and early 1980s (Ibid). Since 1987, leks have been censused more consistently, largely as the result of a concerted effort coordinated by the BLM in cooperation with the California Department of Fish and Wildlife (formerly Game) (CDFW). From 1987- 2011, there have been 4 distinct population cycles (Bi-State Technical Advisory Committee 2012a). From 1989-1992, the number of strutting males was 128 to 185% of the long-term average (LTA) (Ibid). From 1993 to 2003, the number of strutting males decreased to 33 to 84% of the long-term average (Ibid). From 2004 to 2009, the number of strutting males was near the long-term average at 90 to 115% of LTA (Ibid). From 2010 to 2011, the number of strutting males reached all-time highs at 153 to 222% of LTA (Ibid). In 2012, over 500 males were recorded, the highest on record since 1953 (CDFW lek count records 2012). In 2013, the number of males was lower than 2012, but remained above the LTA (CDFW lek count records 2013). In 2014, the number of males reached an all-time peak of 524 (CDFW lek count records 2014). The more recent data (since 1987) reinforces that these populations go through periods of highs and lows, but overall remain stable (Bi-State Technical Advisory Committee 2012a).

Population trend data in Garton et al. (2011) separates the DPS into 2 populations, the North Mono Lake (Bodie PMU and adjacent populations in CA and NV) and South Mono Lake (South Mono PMU including the Long Valley and Parker areas) as these areas are core populations with the most consistent lek count data. Garton et al. (2011) describes the North Mono Lake population as having seen irregular fluctuation between peaks and lows, with 35% declines during some periods. However, despite these apparent declines, Garton (2011) concluded that in the North Mono Lake population that there is no consistent long-term trend for a 40 year period. The South Mono Lake population also showed no obvious pattern (Ibid). The FWS concluded in

their 2013 proposed rule that greater sage-grouse population in the Bodie Hills is relatively stable, but will have reduced population viability in the future (USDI FWS 2013b). Also in the proposed rule, the FWS (Ibid) concluded that sage-grouse abundance declines in the Bi-State DPS are estimated to exceed 50%. However, the most recent analysis of the Bi-State DPS indicates that "the preponderance of evidence suggests that sage-grouse populations are stable within the Bi-State DPS in its entirety over the period of 2003-2012" (United States Geological Survey (USGS), 2014).

Habitat Requirements

Sage-grouse rely primarily on sagebrush to meet their life requirements. Leks, or breeding display sites, typically occur in open areas surrounded by sagebrush; these sites include, but are not limited to, landing strips, old lakebeds, low sagebrush flats and ridge tops, roads, cropland, and burned areas (Connelly et al. 2000). A common feature of lek sites is that they have less herbaceous and shrubcover than surrounding habitats (Schroeder et al. 1999). Several leks and extensive nesting habitat are found in the project area. A recent study conducted on the Bi-State DPS determined that 95% of nests occur within 5 km of a lek (Coates et al. 2013).

Radio telemetry data from 1999 to 2003 identified most nesting sites in areas of mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*) with co-dominant bitterbrush (*Purshia tridentata var. tridentata*) contributing to greater than average canopy cover (USDI BLM 2003). Perennial grass height and cover, generally considered important for nesting success as it helps screen nests from predators, compared favorably with that found in the current sage-grouse habitat guidelines (Connelly et al. 2000, USDI BLM 2003). More recent telemetry studies reported that shrub canopy cover and not residual grass cover or height were the principal vegetation feature used by female sage-grouse in the Bodie Hills to select nest sites (Kolada 2007). Nest success did not appear to be associated with grass cover but was positively associated with shrub cover other than sage (Kolada 2009b). Although the other shrub species were not identified in this research, observations by Bishop BLM personnel of sage-grouse nesting habitat in the Bodie Hills suggest these were mainly bitterbrush with others including wild currant and snowberry. Overall, nest success is high in the Bodie Hills and compares favorably to that reported elsewhere in sage-grouse range (Kolada 2009a). Nesting habitat quality or quantity is not considered a limiting factor for greater sage-grouse in the Bodie PMU. The TNC analysis (Provencher, Low et al. 2009) supports this conclusion, as late seral stages, that contain dense stands of sagebrush, are over represented in the montane sagebrush ecological system, which is the primary ecological system used for nesting.

Telemetry data has documented seasonal movement of a large number of sage-grouse to summer habitat above about 9,000 feet in the project area especially near springs, streams, and meadows (USDI BLM 2003, USGS unpublished data, CDFW unpublished data). As a result, many sage-grouse tend to concentrate in and around high elevation or mesic habitats during the summer (NDOW 2004). Many of these mesic habitats are privately owned by grazing permittees. An apparently smaller number of sage-grouse remain near water sources at lower elevations or move westward across Highway 395 to the east slope of the Sierra (NDOW 2004).

Fall/winter concentrations of sage-grouse have been documented in extensive sagebrush stands at Big Flat and on the Dry Lakes Plateau and the upper Cottonwood Canyon drainage. Winter

habitat is not considered to be a limiting factor for greater sage-grouse in the Bodie PMU and telemetry studies have shown high over-winter survival which compares favorably to that reported elsewhere in sage-grouse range.

In 2012, Preliminary Priority Habitat (PPH) was mapped for the Bi-State DPS in order to provide land managers a tool to guide sage-grouse management by identifying sage-grouse habitat using the radio telemetry locations of sage- grouse, known leks, and vegetation characteristics (Bi-State Technical Advisory Committee 2012b). Based on the PPH model, 81% of the BLM lands in the project area are PPH. The PPH map was used in part as the basis for the proposed critical habitat (USDI FWS 2013c). Nearly 99% of the Bodie Hills project area is proposed as critical habitat (Ibid). These mapping efforts reinforce that the Bodie Hills contain high quality habitat for sage-grouse.

Because ecological systems as delineated by the TNC analysis are broad categories with variation in density, height, and species composition, there is not a simple crosswalk from ecological system to specific life stages for sage-grouse. For example, in winter sage-grouse typically use ecological systems with taller sagebrush as the sagebrush must remain above the snow for the sage-grouse to utilize it. Therefore, ecological systems such as Basin Big Sagebrush, Montane Sagebrush Steppe, Mountain Shrub and Wyoming Sagebrush could all be used in the winter if the structure of the sagebrush is suitable. However, low sagebrush could also be used in the winter if there was little or no snow or the low sage was on a windswept ridge. Low sage can also be used as lekking, roosting or foraging habitat. The primary system used for nesting is montane sagebrush but nesting could occur in other systems, such as Basin Big or Wyoming sagebrush, if the correct vegetative characteristics for nesting were present. The wet meadow and riparian systems are primarily used in the late spring and summer.

While there is no simple crosswalk between the ecological systems mapped by TNC and life stage requirements for sage-grouse, the classes or seral stages within each ecological system identified by TNC can be correlated with some sage-grouse habitat needs. The dense mountain sagebrush sites used for nesting in the Bodie Hills would often be found in class C (mid-open) of the Mountain Sagebrush Steppe ecological system. The TNC analysis found this class to be very over represented in the Bodie Hills (Provencher, Low et al. 2009) (see Appendix B for cover values of major life forms in each class within the ecological systems) consistent with the conclusion of the Bi-State Technical Advisory Committee that nesting habitat quality or quantity is not a limiting factor in the Bodie PMU (2012a). Likewise, winter habitat could occur in these mid-seral classes of various sagebrush ecological systems and is not considered to be a limiting factor (Bi-State Technical Advisory Committee 2012a). Lekking habitat cannot be associated with a particular class of any of the ecological systems. Brood, late brood, and summer habitat includes early and mid-seral stages (A and B) of the all the sagebrush ecological systems as well as the riparian and meadow systems. The TNC analysis found that early seral conditions are underrepresented in key sagebrush ecological systems including Montane Sagebrush Steppe, Basin Big Sagebrush, Wyoming Sagebrush, and Low Sagebrush in the Bodie Hills when compared to the natural range of variability (Provencher, Low et al. 2009) consistent with the conclusion of the Bi-State Technical Advisory Committee that the availability of brood rearing habitat may be a limiting factor for greater sage-grouse in the Bodie PMU (2012a). Very late seral stages of the sagebrush ecological systems such as classes D, E, and U(Tree Encroached)

are largely unsuitable for grouse because of the pinyon-juniper cover. The TNC analysis found that these classes are overrepresented in the Bodie Hills (Provencher, Low et al. 2009). This conifer expansion is one of the greatest threats to sage-grouse in the area (USDI FWS 2013 b, c, and d; Bi-State Technical Advisory Committee 2012a).

In summary, based on telemetry locations, lek monitoring and habitat mapping discussed above, sage-grouse are likely to use the majority of the shrub dominated ecological systems in the Bodie Hills. Any shrub dominated ecological systems that contain sagebrush (such as Basin Wildrye-Basin Big Sagebrush, Low Sagebrush, Montane Sagebrush Steppe, Mountain Shrub and Wyoming Sagebrush) could be used by sage-grouse at any time of year, depending on the composition and location of the habitat. The most important ecological systems proposed for treatment are the low sagebrush and the montane sagebrush as they represent important habitat (lekking, winter and breeding) and they are abundant in the project area. However, the importance of riparian areas and wet meadows should not be undervalued based on the limited treatment proposed. The majority of riparian systems in the Bodie Hills are privately owned and site-specific management action is the best and most efficient approach for improving their ecological condition. Therefore, the proposed action focuses on the restoration of upland ecological systems, with minimal treatments proposed in riparian systems.

Threats

The Bi-State Technical Advisory Committee (2012a) ranked the risks to sage-grouse in the Bodie PMU. Wildfire and pinyon-juniper expansion were ranked the highest threats to the birds in this PMU, relative to other risks (Ibid). Wildfire can result in landscape scale changes in sage-grouse habitat and could therefore result in negative impacts to sage-grouse (Ibid). Pinyon-juniper expansion is occurring in and adjacent to important sage-grouse habitat in the Bodie PMU and can reduce habitat connectivity and can also increase risk of catastrophic fire due to increased fuel loads (Ibid). The FWS (2013b) also notes that the threats in the Bodie PMU are comparatively less in scope and severity than the other PMUs.

*Alternative: No Action*

*Direct and Indirect Effects*

In the short-term, taking no action would preserve the existing late seral dominated ecological conditions. There would be no alteration in habitat for grouse and no disturbance associated with treatment. However, in the long-term taking no action could result in an increased risk of catastrophic loss of habitat from wildfire. Wildfire would remove habitat indiscriminately. This could either be beneficial or detrimental to grouse depending on the location, size and intensity of burns. Important habitats for grouse may be lost either directly from fire or to cheatgrass conversion after the fire. Because wildfire cannot be planned, it is impossible to target areas that would benefit grouse and also reduce risks to high quality or important grouse habitat. It would be left to chance which habitats would burn.

There is also likely an increase in high risk vegetation classes. For example, without treatment there may be an increase in conifer moving into sagebrush habitats. With an increase in conifer, habitat becomes largely unsuitable for grouse. Baruch-Murdo et al. (2013) found that at even at very low levels of expansion, there are population level impacts to sage-grouse and that at 4% canopy cover, no leks were active. Conifer alters the sagebrush dominated ecological systems by

taking resources such as water from the system which results in a decline in understory vegetation such as sagebrush and native grasses and forbs (Miller and Eddlemen 2000). Pinyon and juniper moving into areas previously dominated by sage also creates perches for grouse predators. Recent studies have shown that brood rearing grouse tend to avoid areas with pinyon-juniper (Casazza et al. 2011) and that sage-grouse select nest and brood sites with lower densities of avian predators (Dinkins et al. 2012). Casazza et al. (2011) posited that the result of the pinyon-juniper movement into sagebrush habitats "may pose a significant risk to the persistence of populations." Pinyon-juniper expansion has significantly altered the habitat for sage-grouse both range-wide and in the Bi-State, resulting in a shrinking of available habitat for grouse (USDI FWS 2013c). The No Action alternative, by not treating these encroaching trees, continues this trend of gradual loss and degradation of habitat.

The availability of early and mid-seral sagebrush and mesic habitats that are important as early brood, late brood, and summer habitat may be a limiting factor for greater sage-grouse in the Bodie PMU (Bi-State Technical Advisory Committee 2012a). Recent vegetation mapping efforts conducted by The Nature Conservancy (TNC) for this project found that late seral conditions are extremely over-represented in montane sagebrush associated communities in the Bodie Hills when compared to the natural range of variability and further supports this hypothesis. Taking no action, could therefore limit growth of populations of sage-grouse in the project area.

*Cumulative Effects*

The cumulative effects analysis area is the extent of the Bi-State population. Potential cumulative impacts in the project area include fire suppression, mining, recreation, private lands vegetation treatment, pinyon-juniper expansion, development, and livestock grazing. These activities can result in fragmentation of habitat, destruction of vegetation that provides foraging and nesting habitat, increase in invasive species, and increased noise that could impact sage-grouse. Past and current management related to these activities is reflected in the current condition of the habitat and population. Impacts from past and current management are also reflected in the consequences of taking no action discussed in the direct and indirect effects analysis for this alternative. Effects of ongoing management such as the small scale vegetation management projects that have already been implemented, fire suppression, and grazing by livestock are included in the assessment of current conditions as well as the modeling of future conditions.

Livestock grazing can lead to loss of grasses that provide habitat for insects that grouse consume, disturbance of grouse by cattle during nesting season and fences that provide predator perches and provide visual obstructions that can lead to collision mortalities. However, cumulative effects from existing livestock grazing (including those discussed in the above paragraph) are reflected in the current condition for grouse and there are no changes in grazing management that are reasonably foreseeable (see Issue 1). Therefore, grazing is not expected to be a cumulative impact to grouse. Finally, permitted livestock grazing is considered a low risk in the Bodie PMU based on the assessment in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a). Similarly, the FWS notes that the available data do not indicate that grazing is a major threat to habitat (USDI FWS 2010b). In their 2013 proposed rule, FWS states that grazing in the Bodie PMU currently poses minimal impacts (USDI FWS 2013b).

Similarly, future mining is not reasonably foreseeable and is therefore not considered a cumulative effect (Issue 1).While recreation and development can play a role in removing habitat for grouse, no reasonably foreseeable changes in these activities are known at this time. Private landowners treating riparian vegetation is likely to improve the condition of the habitat for grouse, but these treatments represent a small proportion of the Bodie Hills. When viewed from a landscape scale, they will result in minor improvements in habitat for grouse. Continued loss of habitat to pinyon-juniper across the Bi-State DPS is a significant concern. Because the No Action alternative does not address this threat and because it contributes to the condition, cumulatively, there would be a slow continual loss of habitat from pinyon-juniper expansion, Bi-State wide.

West Nile virus (WNv) could also be a cumulative impact, resulting in a loss of birds. At this point, WNv is not considered a high level threat as it has been documented in only a small number of cases and the last documented case in the Bi-State DPS was in 2005 (Cassaza et al. 2009, Bi-State Technical Advisory Committee 2012a). The FWS (2010b) found that while the small populations such as those in the Bi-State DPS were at higher risk of extirpation from WNv, the "high elevations and cold temperatures common in much of the Bi-State area likely reduce the chance of a population-wide outbreak." In their 2013 proposed rule (USDI FWS 2013b), the FWS also state that WNv "is not considered a significant impact at this time."

Legal hunting of grouse is not likely to be a concern as a cumulative impact. This is because the state closely monitors the grouse numbers and sets the hunt levels accordingly. If appropriate they can set the number of permits to zero. In the project area, permits have ranged from 10 to 35 per year from 1998 to 2008. In 2010, the State of California considered removing sage-grouse hunting all together to reduce any potential impacts to population numbers (State of California 2010). Hunting was permitted because 1) the USFWS finding (2013b) considered hunting a relatively low risk, stating "In the Bi-State area, hunting is limited to such a degree that it is not apparently restrictive to overall population growth."; 2) sage-grouse hunting in California and in the North Mono Zone is highly conservative at less than 5% of the estimated fall population 3) population numbers in the Mono County hunt zones are high in comparison to long-term averages (Ibid). The State of California's strategy for setting limits at low levels is consistent with recommendations in Connelly et al. (2000) that up to 10% of the fall population could be removed through hunting. The annual determination of hunt numbers is also in line with recommendations from Reese and Connelly (2011) that population numbers be monitored closely to improve recommendations for permit numbers. In their 2013 proposed rule the FWS (USDI FWS 2013b) state "following a thorough analysis of the best available information, we determined that hunting, scientific and educational uses, pesticides and herbicides, and contaminants have negligible impacts to the Bi-State DPS at this time." In summary, while hunting may result in the loss of individual grouse, it is not considered a population level impact and would be limited by the state to ensure it would remain this way.

*Summary*

Habitat conditions have generally improved or remained stable throughout the Bodie PMU since the early 1990s with no measureable loss of habitat or habitat quality that correlates to documented changes in population levels. While habitat conditions have improved or remained stable, taking no action may have negative impacts on grouse. There may be loss of habitat due

to wildfire and subsequent conversion to cheatgrass. Negative impacts could range from small to large depending on wildfire behavior. There may be an increase in conifer-juniper, resulting in decreasing habitat quality for grouse. Finally without treatment, the early seral stages will continue to be under represented in sagebrush ecological types, which may be limiting population numbers due to lack of early brood rearing habitat.

*Alternative 2. Proposed Action*

*Direct and Indirect Effects*

Sage-grouse are widespread across ecological systems in the project area; therefore a variety of treatments could occur in sage-grouse habitats. The proposed action is designed to be beneficial to sage-grouse on a landscape scale by improving habitat conditions and reducing the risk of large scale, high intensity wildfires that would remove habitat or lead to cheatgrass conversion. Project design features limit impacts to sage-grouse and their habitat as recommended by Connelly et al. (2000). The design features also maximize the benefit to sage-grouse by targeting treatments in the most favorable areas to improve habitat for sage-grouse. Treatments are expected to be adaptive, therefore if treatment results do not meet expectations, methods can be altered or if they are successful they can be used elsewhere in the project area.

Implementation of the proposed action as informed by the TNC Bodie Hills Conservation Action Plan (Provencher. Low et al. 2009) is a conservation action recommended in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a). Projects will also be assessed using the Conservation Planning Tool (CPT) designed by USGS for the Bi-State DPS to determine the relative benefit of projects for sage-grouse. The proposed treatments also incorporate many of the conservation objectives in the 2013 FWS Greater Sage-grouse Conservation Objectives Final Report (USDI FWS 2013a). The amount of treatment as compared to the amount of habitat available to grouse is small, with less than 10% of the BLM lands in the Project Area being treated over a 10 year period.Based on the TNC analysis, the acres treatment in the proposed action would provide a benefit to the ecological systems but treatment of a larger number of acres would provide a better long-term benefit.

While the proposed treatments are designed to benefit sage-grouse, there are potential direct and indirect effects from implementation. Potential direct and indirect impacts from implementation of the proposed action include short-term impacts such as sage-grouse being flushed from or avoiding areas during treatments and longer term impacts such as loss of habitat and loss of connectivity to areas of use from prescribed burn or mowing treatments.

Short-term Impacts from treatments

There may be short term impacts to individuals caused by smoke, machinery or loss of cover. Any short-term impacts would be limited by design features. Examples include timing restrictions for treatments to avoid disturbance near grouse during key times such as lekking or nesting and also by the limited amount of treatment that would occur over a 10 year period. Because only 10% of the project area would be treated over 10 years, sufficient habitat for grouse would exist for birds to avoid any short term impacts from disturbance during treatment.

Prescribed fire

Prescribed fire, when used in appropriate sites, can be a tool to improve the amount and nutrient quality of native forbs used as forage for sage-grouse (Miller and Eddleman 2000; Pyle and Crawford 1996; Thacker 2010). When used in the montane sagebrush ecological system, burning can be beneficial, leading to greater use by sage-grouse for brood rearing, especially in small patches (Thacker 2010). Prescribed fire can also break up fuel loads, thus reducing the risk of a larger or more intense fire in the future (Crawford et al. 2004). Fire can break up a homogenous sagebrush landscape and move conditions to earlier seral stages. This is of particular importance as the limited abundance of early seral stages that provide brood rearing habitat may be limiting sage-grouse populations in the project area (Bi-State TAC 2012a). Also, grasses and forbs are important for sage-grouse both as food source, habitat for insects that chicks consume in their first days, and as cover for chicks (Barnett and Crawford 1994; Haddad et al. 2001). Pyke (2011) notes that if the desired outcome of restoration is an increase in herbaceous understory, that reduction or temporary elimination of sagebrush may be necessary.

While fire can be beneficial to sage-grouse, many studies describe negative impacts for sage-grouse due to the loss of sagebrush that results from prescribed burning (Nelle et al. 2000; Beck et al. 2009; Rhodes et al. 2010; Beck et al. 2012). Additionally, the FWS Conservation Objectives Final Report (USDI FWS 2013a) recommends avoiding sagebrush removal or manipulation in sage-grouse breeding or wintering habitats. The studies citing negative impacts are frequently assessing prescribed burns of much larger size than the 124 acre size proposed and are completed in Wyoming sagebrush. For example, Nelle et al. (2000) had an average burn size of 2,409 acres and Beck et al. (2009) burned 57% of the sagebrush in a 58 $km^2$ area or over 14,000 acres. Also, the research presented in both Beck et al. (2009 and 2012) and Rhodes et al. (2010) were completed in Wyoming sagebrush.

The conclusions reached in many studies of fire and sagebrush noted above are minimally applicable for the treatments proposed, because no burning is proposed in Wyoming sagebrush and because project design features limit the size of burns in sage-grouse habitat to much smaller than those studied. Specifically, while the maximum burn size proposed is 124 acres in sage-grouse habitat, the goal is not to completely remove 124 acres of sagebrush, as is often found in studies. Rather, the goal of the proposed prescribed burning is to create a mosaic of sagebrush, with approximately 1-2 acre pockets of burned areas. This would ensure that in the short-term (immediately after treatment), sage-grouse could use the area and, as early as the next growing season there would be an increase in grasses and forbs. In the long-term, there would be an increase in early seral stages and likely reduction in risk of habitat loss from wildfire.

Cheatgrass conversion is a potential threat from this treatment. However, this is not expected to occur at a level that would be detrimental to sage-grouse. This is primarily because prescribed fire will not be used in areas with a high risk of cheatgrass conversion. Additionally, prescribed fire will be used as a limited tool (see design features and description of methods), in small areas, and treatments will be monitored and adapted if they the results do not meet project objectives.

In summary, there are numerous studies that have been completed to assess the effects of prescribed burning in sage-grouse habitat (Knick et al. 2005). The conclusions reached are variable, ranging from negative, to neutral to positive (Ibid). Much of this appears to be a result

of site specific attributes such as sagebrush species or of design features that allow burning both large patches of sagebrush and high proportions of available sagebrush. Because the Bodie Hills has an overabundance of late-seral stages in sagebrush dominated ecological systems, the removal of approximately 1-2 acres patches within several 124 acre burn areas is not expected to have any adverse impact on sage-grouse populations. As there would likely be an increase in forbs and grasses in those patches and the patches would be returned to an earlier seral stage, burning as proposed in the proposed action would likely be beneficial to sage-grouse if it creates these small patches without increasing cheatgrass. Wildfires that have burned in the Bodie Hills and the South PMU are evidence of this. Treatments will follow guidelines in Connelly et al. (2000), which are incorporated into design features of the proposed action. Design features such as timing restrictions, limitations the size of and location of burn areas, limitations on total areas treated vs. available and adaptive management ensure that these burns would not lead to adverse impacts to sage-grouse or their habitat. Conversely, the treatments are likely to benefit sage-grouse by addressing one of the potential limiting factors for sage-grouse in the Bodie Hills (lack of early seral stages for brood rearing) and reducing the risk of large scale, high intensity wildfires.

Mechanical treatment of sagebrush

Mowing will be the preferred method of treatment where maintaining some sagebrush cover is important. Hand cutting will be a preferred method where variable shrub cover and mosaic patterns are important especially in sage-grouse habitat, areas with complex vegetation patterns or high visual concerns. Both mowing and hand cutting have similar impacts and are therefore combined in this discussion. In sage-grouse habitat, mechanical treatment will be used in primarily small areas (less than 124 acres where possible) as recommended by Connelly et al. (2000). Treatment units will use irregular patterns to create more edge and islands of vegetation will be left for cover (Bishop RMP pg. 11). Units will be designed to be small enough to provide good edge and cover habitat and to provide nearby seed sources for native vegetation recruitment.

Similar to prescribed burning, there is variation in the outcome of mowing in sagebrush (Hess and Beck 2012; Davies et al. 2009,;Davies et al. 2011a; Davies et al. 2012a,b and c). This variation is often a result of whether studies occur in Wyoming sagebrush (Hess and Beck 2012; Davies et al. 2009; Davies et al. 2011a,; Davies et al. 2012b) vs. mountain sagebrush communities (Davies et al. 2012a and c). The Wyoming sagebrush studies that often result in negative impact to habitat have little applicability to the proposed action as mechanical treatment is not proposed in these systems except in 750 acres of fuel breaks, primarily along roads.

Factors aside from species of sagebrush that can influence mechanical treatment success include presence of cheatgrass, understory composition, patch size, average precipitation, percentage of sagebrush cover removed and height of mower. Similar to the use of prescribed fire, mechanical treatments, such as mowing or hand cutting shrubs can break up a homogenous sagebrush landscape and create a mosaic of different seral stages. This can benefit sage-grouse by increasing the availability of grasses and forbs and the diversity of seral stages (Dahlgren et al. 2006; Davies et al. 2012a and c). In mountain sagebrush, Davies et al. (2012a and c) found that perennial grass and annual forb production increased after sagebrush mowing and that cheatgrass was not increased. As described in the prescribed fire section, grasses and forbs are important for

sage-grouse both as food source, habitat for insects that chicks consume in their first days, and as cover for chicks. Mechanical treatment can also benefit sage-grouse by reducing risk or intensity of wildfire that would indiscriminately remove a larger portion of habitat.

Cheatgrass conversion can be a concern with mechanical treatments. However, this is not expected to occur at a level that would be detrimental to sage-grouse. This is primarily because mowing will not be used in areas with a high risk of cheatgrass conversion. Additionally, cheatgrass conversion is not expected due to the limited amount of treatment proposed, design features to minimize the risk of cheatgrass (see design features and description of methods), and the adaptive management strategy proposed.

In summary, mechanical treatments within the constraints of the proposed action would result in long-term benefits for sage-grouse due to the increase in early seral stages that are currently underrepresented in the project area and that may be limiting sage-grouse populations (lack of early seral stages for brood rearing) in the Bodie Hills. The treatments are also designed to reduce the risk of large scale, high intensity wildfires, which benefits sage-grouse at a landscape scale.

Conifer removal

As discussed in the No Action alternative, removal of conifer would be beneficial to sage-grouse in the long-term. Conifer expansion and wildfire are considered the main threats to the Bi-State DPS and this treatment would directly address that threat. Water used by conifers would be available to sagebrush, grasses and forbs, which are necessary for grouse forage and cover. Perches for grouse predators would be reduced. Wildfire risk would be decreased with a decrease in fuel loading. Removal of conifer could result in fences used for livestock management becoming more visible and therefore becoming a strike hazard to sage-grouse. However, conifer removal would be applied primarily in the earlier stages of pinyon and juniper expansion where trees are smaller, densities are lower and there is less slash to dispose of, therefore fences that currently exist are likely already visible. Additionally, as conifers and fence posts currently exist as potential perches, the removal of the conifers reduces the number of perches available to predators overall.

In summary, conifer removal is expected to be beneficial for sage-grouse. In the short term, fewer perches would be available for predators. In the long term, more resources would be available for sagebrush, forbs and grasses that sage-grouse depend on for successful reproduction and survival.

Seeding and Invasive Species Treatment

Seeding and treatment of invasive species would be considered beneficial to sage-grouse as they would be designed to improve the quality of habitat by increasing native species diversity and density.

Livestock Rest Periods

Due to the design features for range related to resting treated areas from livestock grazing, it is possible livestock would be displaced, leading to additional grazing pressure on untreated areas and a potential increase in disturbance in untreated areas. This is not expected to lead to negative

impacts to grouse because permittees will continue to follow the Standard and Guidelines in their permits, in which the effects to wildlife, including sage-grouse, have been analyzed under separate NEPA documents. Also, as described in the Range design features, the BLM will consult and coordinate with range permittees in the design, layout and timing of the treatments. This will ensure that any changes to livestock use will be within the Standards and Guidelines of the existing permit.

*Cumulative Effects*

Cumulative effects are the same as those discussed in the No Action alternative. The primary difference is that while the No Action alternative is likely to result in long-term negative impacts to grouse and their habitat, the Proposed Action would result in long-term positive impacts to grouse and their habitat. Because the project is designed to benefit grouse, the incremental impacts of the project when combined with the past, present, and reasonably foreseeable future actions would be minimal and would not lead to negative population level impacts. Moreover, all future projects on BLM lands would be subject to measures to minimize impacts on wildlife, including any grouse and their habitat.

This alternative addresses the highest threats to grouse (wildfire and pinyon-juniper expansion) in the Bodie PMU (Bi-State Technical Advisory Committee 2012a). In summary, the project would benefit grouse by reducing the risk, size and intensity of wildfire that could lead to the loss of habitat for grouse. It would increase the amount of sagebrush in early seral stages, providing both diversity of habitat and improving habitat types that may be limiting grouse populations. Removal of conifer trees would remove predator perches and improve understory vegetation. Treatments would increase plant diversity that provides both cover and forage for grouse.

*Alternative 3. Increased acreage*

*Direct, Indirect, and Cumulative Effects*

The increased acreage alternative treats approximately 14% of the BLM lands in the Project Area. The impacts and benefits from this alternative are similar to those described in the Proposed Action. The primary difference is the additional benefit gained, particularly from removal of additional conifers in low sage and montane sagebrush steppe and the additional treatment of sagebrush in montane sagebrush steppe and Wyoming big sage-brush (loamy). Similarly to the Proposed Action, there may be short-term impacts during and immediately after treatment, but there would be increased long term benefit as compared to the Proposed Action. The risk of wildfire would likely be reduced from the Proposed Action. There would be fewer predator perches, with the removal of conifers and there would be an increase in early seral stages that may be limiting sage-grouse in the project area. This alternative treats a larger proportion of the preliminary priority habitat, increasing benefits to grouse.

Cumulative effects are the same as those discussed in the No Action alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to grouse habitat, this alternative would result in long-term positive impacts to grouse and their habitat. Because the project is designed to benefit grouse, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 4. CWPP WUI only*

*Direct, Indirect, and Cumulative Effects*

This alternative treats 39% less acreage than the Proposed Action. Across all ecological types, except Wyoming Sagebrush Loamy, there is a decrease in the amount of PPH available for treatment. Specifically, the proportion of PPH available for treatment in montane sagebrush is 40% less in this alternative than in the Proposed Action and in low sage, the PPH available for treatment is reduced by 63%. This will significantly decrease the benefits to grouse as these are important ecological types for them. The impacts and benefits from this alternative are similar to those described in the Proposed Action. There would be fewer short-term impacts to sage-grouse because there would be fewer treatments. However, the long-term benefits to grouse are much reduced over the Proposed Action both because there are fewer acres treated and because the treatments would be focused on WUI lands, which do not always overlap with the best grouse habitat. Benefits of reduced risk of wildfire would remain, but would be focused only in WUI areas, which would leave large tracks of sage-grouse habitat untreated and vulnerable to increased risk of larger, higher intensity fires (Issue 5). Rather than looking at treatments in a landscape approach to improve habitat, this alternative limits treatments based on land status, which provides fewer benefits for grouse.

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to grouse habitat, this alternative would result in limited long-term positive impacts to grouse and their habitat. This alternative provides the least benefit to grouse except for the No Action, based on the number of acres available to treat in PPH. Because the project is designed to benefit grouse, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 5. Limited Treatment in WSA*

*Direct, Indirect, and Cumulative Effects*

This alternative treats 24% less acreage than the Proposed Action. This reduces the benefits to grouse by limiting the number of acres of PPH available for treatment. In montane sagebrush, there is a 4% reduction in number of acres of PPH available for treatment, in low sage, a 9% decrease and in wet meadows, important for brood rearing, there is a 33% reduction in available PPH acres. While this alternative treats a very similar number of acres as the Proposed Action in PPH, it limits the tools available in WSAs. The loss of tools, such as mowing and mechanical removal of conifers, will limit the ability to improve grouse habitat and could result in an increased risk of wildfire in these WSAs when compared to the Proposed Action and Increased Acreage Alternatives. Overall, the impacts and benefits from this alternative are similar to those described in the Proposed Action. There would be fewer short-term impacts to sage-grouse because there would be fewer treatments. However, the long-term benefits to grouse are reduced over the Proposed Action both because there are fewer acres treated and because of the limited treatment types available in the WSA. This is of particular concern in the low sagebrush where conifer removal is reduced by almost 50%. Additionally, sagebrush treatment in the montane sagebrush steppe is reduced by 27%. These reductions limit the benefits to sage-grouse. Rather than looking at treatments in a landscape approach to improve habitat, this alternative limits tools available for treatments based on land status, which provides fewer benefits for grouse.

Cumulative effects are the same as those discussed in the no action alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to grouse habitat, this alternative would result in limited long-term positive impacts to grouse and their habitat. This alternative provides more benefits for grouse than Alternatives 4 and 6, due to the increased acreage available for treatment when compared to these alternatives. However, because of the limited tools available for treatment in the WSA and the lower acreage available, the benefits are reduced when compared to Alternatives 2 and 3. Because the project is designed to benefit grouse, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 6. No Treatment in WSA*
This alternative proposes treatment of 67% of the acres in the Proposed Action. This reduces the benefits to grouse by limiting the number of acres of PPH available for treatment. Specifically, there is a 56% decrease in low sage PPH acres available for treatment and a 41% decrease in the montane sagebrush PPH acres available for treatment. This will significantly decrease the benefits to grouse as these are important ecological types for them. The impacts and benefits from this alternative are similar to those described in the Proposed Action. There would be fewer short-term impacts to sage-grouse because there would be fewer treatments. However, the long-term benefits to grouse are reduced over the Proposed Action both because there are fewer acres treated and because no treatment would occur in WSAs. This is of particular concern in the low sagebrush where conifer removal is reduced by almost 50%. Additionally, treatment in the montane sagebrush steppe is reduced from 10,550 acres to 6,330 acres. Reductions in these habitats important to grouse limit the benefits to sage-grouse from treatment. Rather than looking at treatments in a landscape approach to improve habitat, this alternative avoids treatments based on land status, which provides fewer benefits for grouse.

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to grouse habitat, this alternative would result in limited long-term positive impacts to grouse and their habitat. Because the project is designed to benefit grouse, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

**Pygmy Rabbit**
Status
The pygmy rabbit is a BLM sensitive species and was petitioned for listing under the Endangered Species Act in 2003 (USDI FWS 2010c). In 2010, the FWS determined that listing was not warranted.

Occurrence in the project area
The pygmy rabbit is known to occur in the Bodie area. Notable areas of known occupied pygmy rabbit habitat include the Bodie Creek drainage, the historic Bodie Racetrack, Murphy Meadows, and the Aurora Creek drainage. In the Bodie Creek drainage, burrow systems are commonly located on earthen dams constructed during the historic mining period.

Habitat

Sagebrush is the primary component of pygmy rabbit habitat as it used for both food and cover. In the Bodie Hills, pygmy rabbit habitat is typically associated with drainages and small basins comprised of deeper, depositional clays and loams that provide a suitable substrate for burrow construction. Characteristically these areas are free of rocks, with soils soft enough to dig easily yet cohesive enough to support burrows without collapsing. Soil type may be an important factor in pygmy rabbit habitat selection. In California and Nevada, occupied sites tend to have soils that are friable and loamy (Larrucea and Brussard 2008a). Pygmy rabbits prefer tall, dense patches of sagebrush (Green and Flinders 1980; Larrucea and Brussard 2008b). Sagebrush cover and type is variable, and active burrow systems have been located in areas comprised of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), and silver sagebrush (*A. cana*). Grass cover is also variable and heavily dependent upon site conditions.

Pygmy rabbits are rarely found in conifer encroached sagebrush habitats, with the presence of even a few trees signaling absence of pygmy rabbits (Larrucea and Brussard 2008b). Pygmy rabbits rely heavily on sagebrush in their diet throughout the year. In winter sagebrush is 99% of their diet (Green and Flinders 1980). In summer, sagebrush intake decreases to 50%, with grasses and forbs completing the other 50% (Green and Flinders 1980). Pygmy rabbits may be found in the Basin Wildrye-Big Sagebrush, Wyoming Sagebrush and Montane Sagebrush Steppe ecological systems.

*Alternative 1. No Action*

*Direct and Indirect Impacts*

In the No Action Alternative, there will be no direct impacts to pygmy rabbits as no treatments are planned that could cause short-term disturbance or mortality. Pygmy rabbits prefer dense older sagebrush stands, therefore maintaining current habitat would benefit the pygmy rabbit in the short-term. However, taking no action could result in loss of habitat and conversion to cheatgrass. Wildfire is considered one of the greatest threats to pygmy rabbits due to this loss of habitat from conversion to cheatgrass (Larrucea and Brussard 2008b). Taking no action could result in wildfire in which location, size and intensity are detrimental to pygmy rabbits. Alternately, planning treatments to protect key pygmy rabbit habitat would reduce the risk of complete loss of habitat. In addition to negative impacts from wildfire, there may be negative impacts from conifer movement into sagebrush. Pygmy rabbits generally avoid areas with conifer trees, therefore habitat may be lost as trees continue their expansion into sagebrush habitats.

*Cumulative Effects*

As described in the sage-grouse cumulative effects discussion, any effects of past and current management are reflected in the background discussion and the direct and indirect effects analysis of the no action alternative. Potential future cumulative impacts in the project area include fire suppression, potential future mining, livestock grazing, and recreation. These activities can result in fragmentation of habitat, destruction of vegetation that provides foraging habitat, and increase in invasive species, and increased noise that could impact pygmy rabbits. As discussed in the sage-grouse cumulative effects analysis, there are no reasonably foreseeable changes in these activities, therefore there are no cumulative effects related to them. The effects

from climate change and wildfire on vegetation are reflected in the modeled predictions and reflected in the direct and indirect effects analysis. Specific to pygmy rabbits, increasing temperatures resulting from climate change may lead to decreased snowpack. In winter pygmy rabbits forage in subnivean tunnels that protect them from predators. A decrease in snowpack could lead to higher predation rates in winter months (Larrucea and Brussard 2008b). Potential increasing temperatures may also lead to an increase in wildfires (Larrucea and Brussard 2008b). An increase in wildfires can lead to the direct loss of habitat and the conversion of habitat to cheatgrass, unsuitable for pygmy rabbits (Larrucea and Brussard 2008b).

*Alternative 2. Proposed Action*

*Direct and Indirect Effects*

Treatments that could occur in pygmy rabbit habitat include conifer removal, mowing, seeding, broadcast and pile burning and weed treatment. Potential direct and indirect impacts from the project include disturbance or direct mortality during treatments and habitat loss and alteration. Direct impacts from machinery disturbing rabbits, destroying dens or running them over are unlikely because in suitable habitat, pygmy rabbit surveys would be completed prior to treatment. If pygmy rabbits are found during survey, their den complex and a buffer around the complex would be removed from treatment that might adversely impact them.

Indirect impacts from loss or alteration of habitat could occur. Up to 24% of the Basin-Wildrye habitat could be treated in this alternative, and up to 9% of the Montane Sagebrush Steppe. Removal of conifer trees would be positive for pygmy rabbits as they avoid areas with conifer. Likewise, any pile burning associated with these treatments would have little impact as pygmy rabbits are not likely to be found in areas with conifer trees. Treatments to sagebrush such as mowing and broadcast burning could remove pockets of potential habitat for pygmy rabbits. However, as the Proposed Action only plans to treat a portion of these habitats over 10 years, and no occupied habitat would be treated that would adversely impact pygmy rabbits, impacts would be minor. Finally, because treatment in these ecological systems may reduce the intensity and frequency of wildfires and subsequent conversion to cheatgrass, pygmy rabbit habitat would be protected from complete loss due to uncharacteristic wildfire. A recent study was completed to better understand the impacts of vegetation treatments on pygmy rabbits (Wilson et al. 2011). Based on study results, they concurred with other studies that recommended no treatment occur in active pygmy rabbit burrow complexes (Ibid.). However, they note that buffers of no treatment around occupied burrows may be unnecessary and that treatment patches near occupied habitat should be small and allow for movement corridors of untreated patches (Ibid.). The Proposed Action would meet these recent findings as no treatment would occur in occupied habitat and because any treatment of sagebrush would be in a mosaic pattern.

Due to the design features for range related to resting treated areas from livestock grazing, it is possible livestock would be displaced, leading to additional grazing pressure on untreated areas and a potential increase in disturbance in untreated areas. This is not expected to lead to negative impacts to pygmy rabbits because permittees will continue to follow the Standard and Guidelines in their permits, in which the effects to wildlife, including pygmy rabbits, have been analyzed under separate NEPA documents. Also, as described in the Range design features, the BLM will

consult and coordinate with range permittees in the design, layout and timing of the treatments. This will ensure that any changes to livestock use will be within the Standards and Guidelines of the existing permit.

*Cumulative Effects*

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to pygmy rabbit habitat, this alternative would result in long-term positive impacts to pygmy rabbits and their habitat. Because the project is designed to benefit wildlife by improving habitat conditions and reducing wildfire risk, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 3. Increased acreage*

*Direct and Indirect Effects*

Potential impacts from alternative 3 are similar to those in the Proposed Action. The same number of acres of treatment would occur in basin wildrye as in the Proposed Action. There would be an increase in the number of acres of treatment in montane sagebrush steppe, but because treatments would occur in only a small portion of the habitat available for pygmy rabbit, direct impacts would remain minor and short-term. There would be similar beneficial impacts, such as reduction of conifers and reduction in fire severity and intensity as in the Proposed Action, with some additional benefit found in the increased acreage treated in the montane sagebrush steppe.

*Cumulative Effects*

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to pygmy rabbit habitat, this alternative would result in long-term positive impacts to pygmy rabbits and their habitat. Because the project is designed to benefit wildlife by improving habitat conditions and reducing wildfire risk, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 4. CWPP WUI Only*

*Direct and Indirect Effects*

The impacts and benefits from this alternative are similar to those described in the Proposed Action. In basin-wildrye treatment is reduced by 32% from the Proposed Action and in montane sagebrush steppe treatment is reduced by 40%. There would be fewer short-term impacts to pygmy rabbits because there would be fewer treatments. However, the long-term benefits to pygmy rabbits are much reduced over the Proposed Action both because there are fewer acres treated and because the treatments would be focused on WUI lands, which do not always overlap with the best pygmy rabbit habitat. Benefits of reduced risk of wildfire would remain, but would be focused only in WUI areas. There would be a reduction in conifer removal which would limit the benefits as pygmy rabbits are not associated with sagebrush habitats with even a few trees.

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to pygmy rabbit habitat, this alternative would result in long-term positive impacts to pygmy rabbits and their habitat. Because the project is designed to benefit wildlife by improving habitat conditions and reducing wildfire risk, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 5. Limited Treatment in WSA*

*Direct and Indirect Effects*

This alternative treats 24% less acres than the Proposed Action. Treatments in basin wildrye are similar to the Proposed Action (90%), but treatments in montane sagebrush steppe are reduced by 27%. The impacts and benefits from this alternative are similar to those described in the Proposed Action. There would be fewer short-term impacts to pygmy rabbits because there would be fewer treatments. However, the long-term benefits to pygmy rabbits are reduced over the Proposed Action both because there are fewer acres treated and because of the limited treatment types available in the WSA.

*Cumulative Effects*

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to pygmy rabbit habitat, this alternative would result in long-term positive impacts to pygmy rabbits and their habitat. Because the project is designed to benefit wildlife by improving habitat conditions and reducing wildfire risk, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

*Alternative 6. No treatment in WSA*

*Direct and Indirect Effects*

This alternative treats 67% of the acres in the Proposed Action. Treatments in basin wildrye are similar to the Proposed Action (87%), but treatments in montane sagebrush steppe are reduced from 10,550 acres to 6,330 acres. The impacts and benefits from this alternative are similar to those described in the Proposed Action. There would be fewer short-term impacts to pygmy rabbits because there would be fewer treatments. However, the long-term benefits to pygmy rabbits are greatly reduced over the Proposed Action both because there are fewer acres treated and no treatments would occur in WSA. This leaves large swathes of potential habitat untreated and more susceptible to wildfire of increased intensity and size.

*Cumulative Effects*

Cumulative effects are the same as those discussed in the No Action Alternative. The primary difference is that while the No Action is likely to result in long-term negative impacts to pygmy rabbit habitat, this alternative would result in long-term positive impacts to pygmy rabbits and their habitat. Because the project is designed to benefit wildlife by improving habitat conditions and reducing wildfire risk, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would not lead to negative population level impacts.

**American Pika (*Ochotona princeps*)**

Status

The American pika was petitioned for listing under the Endangered Species Act in 2007. In 2010 the FWS determined that the listing was not warranted (USDI FWS 2010a). It is currently being considered for listing as threatened by the state of California (CDFG 2011).

Pikas are typically found in talus fields in alpine and subalpine areas that have sufficient vegetation surrounding them for forage. However, they may be found outside this alpine and subalpine zone (Millar and Westfall 2010). In the Bodie Hills, pikas are found in ore piles and discarded metal pieces resulting from historic mining (Smith 1974). Pikas are herbivores that forage on a variety of plants and also use a diversity of plant species to create hay piles for overwinter sustenance (USDI FWS 2010a). The Bodie Hills population is characterized by islands of suitable habitat (ore and natural talus piles) surround by unsuitable habitat (sagebrush) (Nichols 2011). While sagebrush is not typical plant community used by pikas (Nichols 2011), sagebrush has been found in hay piles in Colorado (USDI FWS 2010a). Other studies have found pikas in ore piles and talus fields surrounded by pinyon and sagebrush (Millar and Westfall 2010). Recent surveys in the Bodie Hills indicate that the number of patches pikas occupy is declining (Nichols 2011). None of the natural talus piles on BLM lands in the project area that had been historically occupied were occupied during these surveys (Nichols 2011). However, pikas occupy ore dumps on adjacent USFS lands outside the project area in the vicinity of New York Hill and natural talus slopes on Masonic Mountain (Millar et al. in review).

While these recent surveys indicate a decline in occupied patches (Nichols 2011), the FWS determined that pika populations are not at risk of extirpation in the Bodie Mountains (USDI FWS 2010a). Additionally, after extensive survey efforts, Millar and Westfall (2010) determined that not only do pika populations not appear to be declining in the Sierra Nevada and Great Basin, they appear to be thriving.

*Alternative 1. No Action*

*Direct and Indirect Effects*

As described in Issue 1, taking no action may result in increased fire size, intensity or frequency in several ecological systems. Taking no action may also result in the increased percentage of late seral or uncharacteristic vegetation classes. Despite these potential consequences of taking no action, any impacts to pikas or their habitat are expected to be minor. Pikas inhabit rocky areas that are sparsely vegetated. Because of this, their habitat is largely insulated from intensive fires. The vegetation around the edges of these rock islands would generally be categorized as being in the Alpine ecological system. The vegetation mapping and assessments conducted by The Nature Conservancy (TNC) found the condition of alpine habitats in the Bodie Hills to be within the natural range of variability. Therefore, there would be no increased risk of wildfire or increase in uncharacteristic classes in the alpine ecological system if no action is taken. In some cases however, the vegetation around the talus or ore piles would be in a brush dominated ecological system such as montane sagebrush steppe. In this case, vegetation classes may be dominated by late seral and uncharacteristic classes. These classes may be susceptible to increased wildfire intensity in the no action alternative, which could have impacts to forage availability if those patches burned. In the No Action Alternative, conifer expansion into

sagebrush or meadows, already at levels outside the natural range of variability, may increase. Conifer expansion can alter the understory vegetation, reducing shrub and forb cover, and also provide perches for avian predators. While this may impact individual pika through altering foraging quality or increasing predators, the FWS determined that alteration of vegetation or native plant succession is not a significant threat to the species (USDI FWS 2010a).

*Cumulative effects*

Historic mining is the primary cumulative effect operating on pika populations as this mining created the existing occupied habitat in the project area. No known proposals exist at this time for future mining. If a specific proposal is submitted, the NEPA analysis will address the potential effects on pika. Livestock grazing adjacent to occupied pika habitat could also be a cumulative effect, by removing preferred forage (Millar 2011). However, no changes in grazing management are expected that would lead to cumulative effects to pika populations. The FWS (USDI FWS2010a) analyzed the potential threats to the pika including climate change, grazing, fire suppression and invasive plant species and concluded that climate change was the only potential threat to the species. Because any effects from taking no action are extremely minor as pika habitat is naturally buffered from most vegetation and wildfire impacts, any interaction with cumulative effects is not expected to impact pika populations.

*Alternative 2. Proposed Action*

*Direct and Indirect Effects*

Short-term impacts from disturbance due to treatments are unlikely as there are no occupied patches on BLM land at this time. Additionally, if patches become occupied, short-term disturbance during treatment would be minor as no treatments would occur on talus or ore piles nor in the Alpine ecological system where most foraging would occur. Foraging could occur in sagebrush ecological systems because not all pika habitat is surrounded by Alpine systems. In this case, short term disturbance may occur during treatment. There may be minor beneficial effects to pika as a result of removal of conifers across ecological types, if these conifers are adjacent to pika habitat. Conifer removal could reduce predator perches and improve understory vegetation and therefore improve forage quality for pika. The size, intensity and frequency of wildfire would likely be reduced in some ecological systems. This would provide limited benefit to pika as their habitat is naturally somewhat insulated from fire. If sagebrush or meadow treatments occurred adjacent to occupied pika habitat, there may be minor benefits to pika if treatments improved forage. However, because pikas are herbivore generalists that adapt their diet to available food sources, it is unlikely that treating or not treating vegetation will have significant impacts.

*Alternative 3. Increased Acreage*

*Direct and Indirect Effects*

The impacts from this alternative are similar to those in the Proposed Action. Benefits to pika remain minimal based on the limited benefit gained for pika from treatment.

*Alternative 4. CWPP WUI only*

*Direct and Indirect Effects*

The impacts from this alternative are similar to those in the Proposed Action. Benefits to pika remain minimal based on the limited benefit gained for pika from treatment.

*Alternative 5. Limited Treatment in WSA*

*Direct and Indirect Effects*

The impacts from this alternative are similar to those in the Proposed Action. Benefits to pika remain minimal based on the limited benefit gained for pika from treatment.

*Alternative 6. No treatment in WSA*

The impacts from this alternative are similar to those in the Proposed Action. Benefits to pika remain minimal based on the limited benefit gained for pika from treatment

*Cumulative effects for all action alternatives*

Cumulative effects are the same as described in the No Action Alternative. Similar to the No Action Alternative, any positive benefit is expected to be minor. Because of this any impacts of project actions when combined with potential cumulative effects would be minor.

**Mule Deer (*Odocoileus hemionus*)**

Mule deer migrate by the thousands through the Bodie Hills between winter range in Nevada and summer range in the Sierra Nevada. Several hundred remain to spend mid-May to mid-October in the project area. The project area provides a variety of upland shrub communities for forage, interspersed with riparian areas and aspen groves providing water and cover. Forbs provide important springtime nutrients to pregnant does. Browse species, especially bitterbrush, are important during the spring and fall migration. Mule deer use riparian and aspen habitats extensively and are reliant on them for fawning habitat.

*Alternative 1. No Action*

*Direct and Indirect Effects*

The primary long term issue for mule deer in California is the change from early successional to late successional forests (CDFG 1998). This has been caused by years of fire suppression that has created forests that are denser with less forage for deer. In the project area, this is the case in the sagebrush ecological types, with a high percentage of the habitat in late seral or uncharacteristic stages. While the project area provides deer habitat and is occupied by deer, the quality of the habitat may be degraded due to this lack of natural variability in seral stages. The lack of vegetation in early seral stages in the project area results in lower quality forage of younger, succulent vegetation. This type of forage is higher in nutrients and easier to digest than older vegetation (CDFG 1998). Conifer expansion also results in decreased habitat quality for deer. The conifers replace grasses, forbs and shrubs that deer use for forage. The late seral and uncharacteristic vegetation class dominated landscape may lead to increased intensity, frequency and size of wildfire. This could result in the direct loss of habitat and subsequent cheatgrass invasion.

*Cumulative Effects*

Potential cumulative impacts in the project area include fire suppression, mining, recreation, private lands vegetation treatment, pinyon-juniper expansion, development, and livestock grazing. These activities can result in fragmentation of habitat, destruction of vegetation that provides foraging habitat, increase in invasive species, and increased noise that could impact deer. Past and current management related to these activities is reflected in the current condition of the habitat and population. Impacts from past and current management are reflected in the consequences of taking no action discussed in the direct and indirect effects analysis for this alternative. Conflicts between livestock grazing and mule deer were identified for the Bodie Hills in 1979-81. These included displacement of does from optimal habitat, especially fawning habitat, when livestock concentrate there; adequate forage conditions on spring and fall migration routes; vegetation condition overall; and degradation of meadows when salt licks or water developments were placed on or near them (no longer allowed under current management). Conflicts and problems have substantially lessened since then but mule deer habitat quality remains an important management priority for BLM in the Bodie Hills.

Effects of ongoing management such as the small scale vegetation management projects that have already been implemented, fire suppression, and grazing by livestock are included in the assessment of current conditions as well as the modeling of future conditions. Generally, as described in Issue 1 and this issue, there are no reasonably foreseeable actions that are expected to have cumulative impacts in the project area, aside from the potential increase in wildfire and conifer expansion. Cumulative impacts from these issues are reflected in the direct and indirect effects analysis as the predicted condition of the vegetation in the no action took these impacts into account.

*Alternative 2. Proposed Action*

*Direct and Indirect Effects*

Potential direct and indirect impacts to mule deer include; noise from treatments causing them to flush from the area, smoke causing difficulty breathing, and loss or alteration of habitat as a result of treatment.

Deer may flush during treatment. However, because only 10% of the project area will be treated over 10 years, deer will be able to disperse to avoid noise or heavy smoke concentrations. Treatments will occur over a period of many years, allowing deer sufficient untreated habitat to use.

Deer require forage, cover and water to survive in an area. Currently the project area provides these characteristics and is key habitat for this deer in this area. There will be no change in water availability as a result of the treatments. Significant cover and forage will remain after treatment, with 90% of the project area receiving no treatment. The remaining untreated areas provide sufficient cover for deer to avoid predation and regulate body temperature. Opening up pockets of habitat that are currently dense with older vegetation will decrease forage in the short term, but in the long term improve forage for deer. After treatment, these areas will be more open, providing unvegetated pockets that will provide openings for grasses, forbs and brush to grow. This new growth would provide higher forage quality forage for ungulates (Willms and McLean 1978). In some cases, treatment such as mowing or burning in Wyoming sagebrush could lead to

declines in wildlife species, including ungulates (Beck et al. 2012). However, treatment would follow design features to limit the size of treatments and adapt if negative impacts are observed, which should limit adverse impacts. Sagebrush treatments in Wyoming sagebrush would consist of mowing or hand cutting, mostly arranged near roads as fuelbreaks. This is designed to reduce fuel loads and continuity, thereby reducing the likelihood of complete loss of sagebrush habitats due to wildfire. In addition to potentially improving the quality of the habitat, thinning the conifers and brush in the treatment areas will reduce the risk of high intensity, large scale fires that could result in the loss of the habitat in the treatment areas and the entire project area. Treatment in aspen stands is expected to be positive for deer. Burning and conifer removal in aspen stands will increase suckering of young aspen, providing better forage.

Cheatgrass conversion is a large concern as cheatgrass does not provide suitable forage or cover for deer and it increases fire risk. All efforts will be made to limit cheatgrass invasion including washing of vehicles prior to entering the treatment areas and limiting treatments in cheatgrass infested areas to avoid spread. Increased cheatgrass would not meet the fuels objectives nor the wildlife objectives of this project. Additionally, cheatgrass abundance in shrub treatment areas will be monitored before and after treatments. Where vegetation appears to be moving towards a cheatgrass dominated site, other options will be evaluated to meet the goals of fuel reduction while maintain native plant dominated communities. Other options may include longer treatment intervals, weed treatment, and/or planting of native perennial grass species.

Due to the design features for range related to resting treated areas from livestock grazing, it is possible livestock would be displaced, leading to additional grazing pressure on untreated areas and competition with ungulates. This is not expected to lead to negative impacts to ungulates because permittees will continue to follow the Standard and Guidelines in their permits, in which the effects to wildlife, have been analyzed under separate NEPA documents. Also, as described in the Range design features, the BLM will consult and coordinate with range permittees in the design, layout and timing of the treatments. This will ensure that any changes to livestock use will be within the Standards and Guidelines of the existing permit.

*Cumulative effects*

Cumulative effects for deer are similar to those described in the No Action Alternative. The primary difference is that the Proposed Action will result in beneficial effects to deer and their habitat in the long-term. The Proposed Action uses vegetation treatments and prescribed fire to decrease the risk of complete loss of habitat. The Proposed Action will improve forage and cover for deer in the long term, while reducing the risk of complete loss of habitat.

Because the project is expected to result in improvement in deer habitat in the long term and because the number of treated acres is relatively small, the incremental impact of the project when combined with the past, present, and reasonably foreseeable future actions would be minimal.

In summary, up to 10% of the project area may be treated over 10 years. This may cause short term impacts to deer. However, treatments are planned on a gradual implementation schedule, with treatments spread across the treatment units over many years. Because of this, impacts to habitat will not be severe. Also, in the long term, it is expected that these treatments should

provide the habitat characteristics deer need, while reducing the potential for complete loss of the habitat due to high intensity or large wildfires. Finally, as mule deer are considered secure or demonstrably widespread, abundant, and secure in California (NatureServe 2007), it is unlikely that completing these treatments will negatively alter population levels and will likely improve habitat.

*Alternative 3. Increased Acreage*

*Direct and Indirect Effects*

Potential impacts from this project are similar to those described in the Proposed Action. Short-term disturbances will be slightly higher, but long-term benefit will also be slightly higher. Increased treatments would increase the quality of habitat for deer over a larger acreage.

*Cumulative Effects*

Cumulative effects are similar to those discussed in the Proposed Action.

*Alternative 4. CWPP WUI only*

*Direct and Indirect Effects*

Potential impacts from this project are similar to those described in the Proposed Action. Short-term disturbances will be slightly lower, and long-term benefit will also be slightly lower. Increased treatments would increase the quality of habitat for deer over a larger acreage. This alternative would be the least beneficial to deer as it treats the fewest acres and focuses on fuel reductions in WUIs rather than rather than an overall improvement of natural range of variability in ecological systems.

*Cumulative Effects*

Cumulative effects are similar to those discussed in the Proposed Action.

*Alternative 5. Limited Treatment in WSA*

*Direct and Indirect Effects*

Potential impacts from this project are similar to those described in the Proposed Action. Short-term disturbances will be slightly lower, but long-term benefit will also be slightly lower. Limiting types of treatments in large areas can limit the potential benefits that can be gained through treatment.

*Cumulative Effects*

Cumulative effects are similar to those discussed in the Proposed Action.

*Alternative 5. No treatment in WSA*

*Direct and Indirect Effects*

Potential impacts from this project are similar to those described in the Proposed Action. Short-term disturbances will be slightly lower, but long-term benefit will also be lower. Removing large areas from treatment provides fewer benefits to deer because it leaves large areas more susceptible to increase wildfire and does not improve successional stages in WSAs.

*Cumulative Effects*

Cumulative effects are similar to those discussed in the Proposed Action.

**Other wildlife including species that use late successional habitats and Migratory Birds**
**Upland Wildlife Habitats**
The dominant upland plant communities that define wildlife habitats and associated wildlife species in the Bodie Hills are sagebrush/bitterbrush and conifer/juniper woodland. Other sagebrush associated upland communities important to a wide variety of wildlife species in the project area include low sagebrush, mountain shrub, and alpine.

The Bodie Hills supports many species of songbirds. Sage thrasher, sage sparrow, Brewer's sparrow, green-tailed towhee, vesper sparrow, lark sparrow and loggerhead shrike are known to breed in the project area and are identified by Partners in Flight (of which BLM is a partner) as sagebrush obligate species of concern. Several other upland songbird species breed here and many more appear as spring and fall migrants (CalPIF 2002; Heath et al. 2001; Paige and Ritter 1999; Weston and Johnston 1980). A 1979 songbird survey included several upland habitats in a wide range of habitat types sampled during breeding and migration. Vertical stratification - the layering of diverse foliage types - was credited for the quality of the upland songbird habitats with highest bird densities and species richness, offering a variety of nesting substrates with good hiding cover and food production (Weston and Johnston 1980). The Bodie Hills also supports important upland game bird species including greater sage-grouse (described in detail above), mountain quail, California quail and chukar partridge (non-native).

Pronghorn antelope summer range encompasses rolling, expansive, open terrain in large parts the project area. In the winter pronghorn migrate east to lower elevations in Nevada. The 1979 surveys identified conflicts between livestock and pronghorn: fences which created an obstacle or hazard; salt blocks and water developments placed on or very near meadows resulting in overutilization; and overutilization of certain areas such as Dry Lakes and Geiger Grade where cattle concentrated throughout most of the grazing season (USDI BLM 1979). Under current management livestock use has measurably decreased since the 1970s, salt is not allowed within ¼ mile of meadows, livestock are moved from pasture to pasture throughout the grazing season, and new fences for wildlife habitat improvement projects have been built with wire spacing meeting design specifications for pronghorn and other wildlife.

Small mammal species found in the Bodie Hills include pygmy rabbit (described in more detail above), and sagebrush vole; both eat green foods including sagebrush, and need friable soils for burrowing in sagebrush habitats. Numerous other small upland herbivores also inhabit these allotments. Most are granivorous and depend upon good seed production for their survival. These, along with several species of lizard and snake, provide food in turn for larger predators.

**Aquatic, Riparian, Meadow, and Aspen Grove Wildlife Habitat**
Non-native trout - rainbow, brown, and eastern brook trout - have been introduced and/or observed at various times in most streams in the Bodie Hills but there are no significant fisheries or popular sport fishing areas. Fish habitat quality was rated "excellent" in part of Rough Creek in a 1979 survey, and good to poor in other parts of the allotments. Native suckers are found in some of the streams (USDI BLM 1978-2013).

Riparian plant communities are important wildlife habitats found in the Bodie Hills. Habitat complexity, primary and secondary productivity, and high plant and animal species diversity are a few of the attributes that these communities provide, especially those that include willow and/or aspen. Aspen groves not associated with streams also have these attributes. In the Bodie Hills, riparian and aspen habitats were found to support by far the highest breeding songbird densities and species richness among the habitat types sampled; high species richness was associated with multiple layers of vegetation including a complex understory (Weston and Johnston 1980). These findings were corroborated in 1998-2003 songbird studies in riparian habitats throughout the eastern Sierra, including Atastra Creek and Clark Canyon. Riparian bird species diversity was positively correlated with the presence of several vegetation layers including herbaceous, willow shrub and tree; and aspen habitats harbored the most diverse breeding bird communities in the eastern Sierra (Heath and Ballard 2003).

Many animals often found in uplands also rely heavily upon riparian and aspen habitats for succulent foods and for thermal and hiding cover. Numerous small mammals, reptiles and amphibians rely on riparian areas and many others are found in both upland and riparian habitats. Larger mammalian predators and many raptors range through several habitat types and find a rich prey base in riparian habitats.

Freshwater marsh habitats are found at the Dry Lakes Plateau (when wet) and at Big Alkali. Riparian communities within the project area are typically classified as Functioning at Risk and some reaches fail to meet Rangeland Health Standards. Many aspen groves also fall short of meeting Desired Plant Community descriptions (see Vegetation section) identified in the Bishop RMP (USDI BLM 1993a). These groves are below their potential and many have lost, to varying degrees, the vertical stratification and understory complexity necessary to support diverse communities of wildlife. Some meadow habitats have also undergone livestock-induced soil compaction, especially affecting small burrowing animals, and changes in plant community to the detriment of wildlife habitat quality as well. The majority of these conditions are relics of historic grazing practices that existed prior to 1980 and severely influenced the habitat conditions encountered today. The trend on most of these habitats has been slowly improving since the late 1970's with measureable improvements documented at many sites, particularly those where livestock use levels are closely managed. Livestock exclosure fences around some stream reaches, meadows, and aspen groves have brought about major improvements to habitat quality at selected sites as documented by monitoring (USDI BLM 1978-2013).

*Alternative 1. No Action*

*Direct and Indirect Effects*

Under natural disturbance regimes, there would be a mosaic of vegetation successional classes ranging from early (the stage just after a disturbance such as fire) to late. Many of the ecological systems in the project area are dominated by late seral and uncharacteristic vegetation classes and thus are outside of the Natural Range of Variability. While many species of wildlife continue to use the project area and thrive, this dominance of late seral and uncharacteristic classes provides less habitat diversity for wildlife. Most wildlife use a range of successional classes to meet their daily or yearly requirements. They may use the forbs and grasses found in early successional classes for forage, but nest or find cover in the larger brush or trees found in late

successional classes. Currently, the lack of early seral classes may be limiting fitness of species that need the characteristics found in these classes. As described above, the other potential consequence of the domination of late seral and uncharacteristic vegetation classes is a potential increased intensity, frequency or size of wildfires. While these wildfires would return the late seral classes to earlier stages, there would be no control over how or where these fires would burn. Intense burns could lead to conversion to cheatgrass, which would decrease the quality of habitat for wildlife. Even species such as pinyon jays, scrub jays and mountain chickadees, which are dependent on pinyon habitat, may be impacted by taking No Action. These species are showing population declines, despite a wide-spread increase in pinyon across the Great Basin (GBBO 2010). These birds are found to be more abundant in open pinyon stands with significant understory than thick pinyon stands with no understory (GBBO 2010). Taking no action allows the continued infilling of pinyon stands, resulting in a reduced understory, making them less suitable for these pinyon dependent birds.

*Cumulative effects*

As described in Issue 1, the potential effects of past and current actions are reflected in the discussion found in the background section as this current condition is the result of these actions. The potential effects from future actions are reflected in the direct and indirect effects analysis for the no action alternative. For example, future effects such as climate change and wildfire are reflected in the predicted departure from NRV that results in higher risk of wildfire impacts. In general, taking no action may result in habitat loss for some species.

*Alternative 2. Proposed Action*

*Direct and Indirect Effects*

There may be short-term impacts to wildlife species from disturbance during treatments. These impacts may include noise, smoke, machinery or human presence causing them to temporarily leave the area. However, because treatments will occur in only 10% of the project area over 10 years, wildlife would have ample habitat to disperse to during treatment. Short-term impacts to passerine birds from mechanical treatments to sagebrush have been studied in Colorado (Magee et al. 2011). This study determined that mechanical removal of sagebrush did not appear to affect birds in the two years after treatment (Ibid.). Another study by Peterson and Best (1987) also found that burning (in a mosaic pattern that created small patches) was not detrimental, but also could not be considered beneficial. These studies were focused on small patches of removal do not provide inferences for longer term impacts or larger patches of fire. However, the mowing and burning is planned in sagebrush ecological systems in small patches in a mosaic pattern. These studies indicate that negative impacts would not be expected in the short term from these treatments.

Long-term impacts

Species that are using habitat in late seral stages will see a reduction in the amount of habitat available to them. This reduction is expected to be minor because less than 10% of the project area will be treated over 10 years. Because the project area is dominated by late seral stages, sufficient habitat in these classes will remain after treatment to sustain these populations. Additionally, there will be no treatment of true conifer woodland in this project, therefore wildlife species using those systems would not be impacted by this project. While there will be a reduction in late seral vegetation types, overall the project is expected to benefit wildlife, even

those that depend on late seral classes. This is because treatments will likely decrease the size, frequency or intensity of wildfires that could remove the habitat altogether. Treatments are planned to improve the habitat diversity and quality for wildlife by creating openings through fire and mechanical treatments. After treatment, these openings provide unvegetated pockets for where grasses, forbs and brush can grow. This increases habitat diversity and also provides important plant species for foraging.

Because a much of the Proposed Action involves treatment of sagebrush ecological systems, species such as the sage-sparrow, sage thrasher and the pronghorn are expected to benefit from the Proposed Action. The Proposed Action will improve the diversity of seral stages that these species use, which should result in increased forage quality and quantity. Additionally, treatments are likely to reduce the risk of wildfire, therefore reduce the risk of the subsequent conversion to cheatgrass. As discussed in the No Action Alternative, even species dependent on pinyon may benefit from the Proposed Action. Treatments will be planned to create feathered edges, mimicking the natural edges that species such as the pinyon jay and other pinyon dependent species prefer. Riparian habitats are very important to wildlife, particularly in the dry climates that are found in the Bodie Hills. The project will improve the habitat in these key areas, increasing forage and decreasing the likelihood of meadows drying up due to rabbitbrush invasion. Aspen treatments, such as removal of conifers and prescribed burning, are designed to prevent aspen stands from converting to upland species and promote aspen regeneration. While there may be short term loss of habitat when conifers are removed or brush is lost during burning, in the long-term these treatments improve the potential for aspen stand persistence and habitat for the species that use them. In the Virginia Creek project area, prescribed burning and conifer removal in aspen stands had little short-term effect on avian species richness and diversity, but there was an increase in number of detections (PRBO 2011).

Cheatgrass conversion is a large concern as cheatgrass does not provide suitable forage or cover for most wildlife and it increases fire risk. All efforts will be made to limit cheatgrass invasion including washing of vehicles prior to entering the treatment areas and limiting treatments in cheatgrass infested areas to avoid spread. Increased cheatgrass would not meet the fuels objectives nor the wildlife objectives of this project. Additionally, cheatgrass abundance in shrub treatment areas will be monitored before and after treatments. Where vegetation appears to be moving towards a cheatgrass dominated site, other options will be evaluated to meet the goals of fuel reduction while maintain native plant dominated communities. Other options may include longer treatment intervals, weed treatment, and/or planting of native perennial grass species.

The project will follow the MOU related to migratory birds, therefore impacts to migratory birds will be minimal in the short-term and are likely to be beneficial in the long-term. This MOU between the USFWS and the BLM includes roles and responsibilities for each agency regarding the Migratory Bird Treaty Act and others. Specifically, the MOU states, “In coordination with the FWS, develop conservation measures and ensure monitoring of the effectiveness of conservation measures to minimize, reduce or avoid unintentional take.” These conservation measures could include avoiding treatments during nesting season or surveying prior to treatment and creating buffers around nests to avoid impacts to breeding birds.

*Cumulative Effects*

As described in issue 1, the potential effects of past and current actions are reflected in the discussion found in the background section as this current condition is the result of these actions. The potential effects from future actions are reflected in the direct and indirect effects analysis for the no action alternative. For example, future effects such as climate change and wildfire are reflected in the predicted departure from NRV that results in higher risk of wildfire impacts. The project is likely to be beneficial for wildlife, therefore the effects of the project, combined with past, present and future action is not likely to have negative impacts on wildlife.

Summary

In summary for most wildlife, there may be short-term impacts during treatment. However in the long term, the Proposed Action is likely to result in reduced risk of wildfire. The Proposed Action is also expected to reduce the size and intensity of wildfire, which can reduce the risk of loss of habitat to cheatgrass. Finally, the treatments will result in an increase in habitat diversity, providing an increase in early seral stages that are lacking currently. Overall the project only treats 10% of the project area over 10 years, so while there may be both short-term negative impacts and long-term benefits, these impacts are minimal based on the limited amount of treatment proposed and the long period over which treatments would occur.

*Alternative 3. Increased acreage*

*Direct and Indirect Effects*

This alternative would have slighter higher short-term impacts to wildlife, but also slightly higher benefits in increased treatment that would lead to better diversity of habitat and reduced risk of wildfire.

*Cumulative Effects*

Cumulative impacts would be similar to those discussed in the Proposed Action.

*Alternative 4. CWPP WUI*

*Direct and Indirect Effects*

This alternative would have slightly lower short-term impacts than the Proposed Action, but also decreased benefits to wildlife as treatments are focused on WUI areas, rather than on an a landscape approach to improve habitat.

*Cumulative Effects*

Cumulative impacts will be similar to those discussed in the Proposed Action.

*Alternative 5. Limited Treatment in WSA*

*Direct and Indirect Effects*

This alternative would have slightly lower short-term impacts than the Proposed Action, but also decreased benefits to wildlife as fewer acres are treated and fewer tools are available for treatment.

*Cumulative Effects*

Cumulative impacts will be similar to those discussed in the Proposed Action.

*Alternative 6. No Treatment in WSA*

*Direct and Indirect Effects*

This alternative would have slightly lower short-term impacts than the Proposed Action, but also decreased benefits to wildlife as fewer acres are treated and fewer tools are available for treatment. Also, large areas would not be available for treatment, which would reduce the benefits to wildlife. Rather than looking at treatments in a landscape approach to improve habitat, this alternative avoids treatments based on land status.

*Cumulative Effects*

Cumulative impacts will be similar to those discussed in the Proposed Action.

## Watershed:

***15. What will the effects of the project be on watershed processes?***

Effects to vegetation, soil, water quality, and wetlands/riparian zones are primary components of watersheds and watershed processes. Those effects are analyzed under Vegetation, Soil, Water Quality, and Wetlands/Riparian Zones, respectively within this document.

*Background*

In general, a watershed is a geographic area that contains a network of channels that drain surface water into a river, stream, or lake system. A drainage divide is used to describe the boundary between one watershed and another. A watershed is the fundamental landscape unit concerned with the collection and distribution of water and sediment (Ritter, et. al. 2002). A watershed may contain complex natural ecosystems, urbanized landscapes, or elements of both. Climate is a major factor controlling water flow patterns and the shaping of landforms and vegetation communities (Gordon, et.al 2004). Vegetation is a source of biological production, and affects water loss through evapo-transpiration, channel bank stability, upslope resistance to erosion, and runoff rates. Natural processes and human activities in a watershed influence the quantity and quality of water that flows to a point of interest.

Two watersheds were identified within the Bodie Hills project area, the Mono Lake and the East Walker River watersheds (see Figure 10). The Mono Lake watershed encompasses 800 square miles (512,000 acres) in both California and Nevada (Mono County Community Development Department Planning Division 2007). The East Walker River watershed encompasses 586 square miles (375,040 acres) in both California and Nevada (NDEP BWQP 1996). The drainage divide roughly goes across Conway Summit (8,143 feet) and meanders northeast to the top of Mt. Biedeman (8,981 feet). The drainage divide then heads in a northerly direction to the top of Bodie Mountain (10,195 feet) before meandering back southeast to Sugarloaf (8,976 feet). From Sugarloaf, the drainage divide meanders in an east to northeasterly direction to Brawley Peak (9,312 feet). The streams within the project area are shown in the project area map (Figure 1).

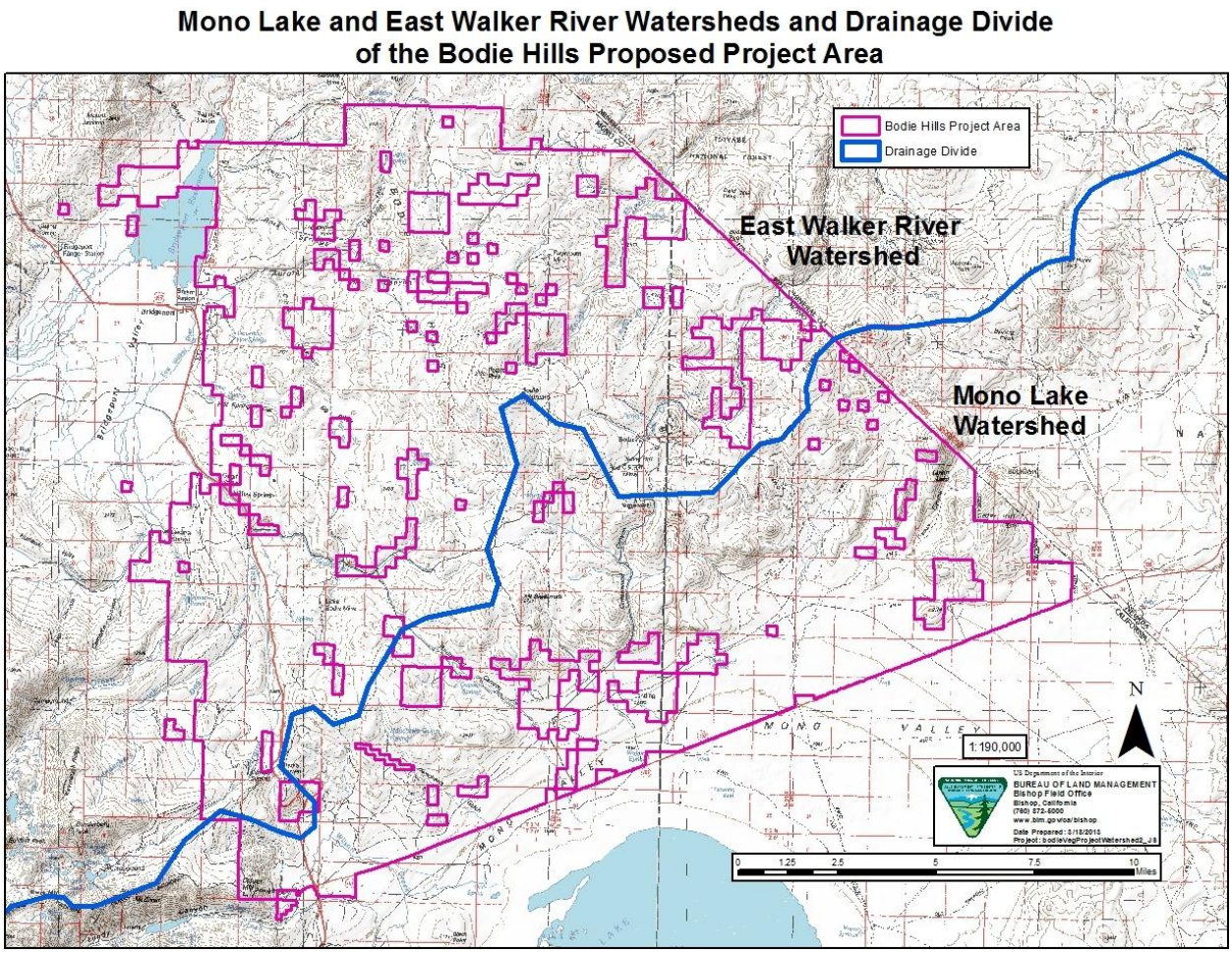



**Figure 10.** Map of the watershed divide in the Bodie Hills project area between Mono Lake and East Walk River.

The Mono Lake watershed encompasses approximately 71,400 acres within the project area, or approximately 14% of the entire watershed. Intermittent creeks associated with this watershed within the project area are Wilson Creek, Bridgeport Canyon Creek, and Cottonwood Canyon Creek. Wilson Creek ditch originating near Conway Summit, receives water from Virginia Creek which was allocated to Conway Ranch in a water right granted in 1936. A few named surface springs associated with this watershed within the project area include Kirkwood Spring, Waford Spring, Murphy Spring, Coyote Spring, and Rancheria Gulch Spring. There are many other unnamed springs and seeps associated with this watershed within the project area. Some channels within the watershed are ephemeral and carry water only during and immediately after a rain event. Some of these channels are dry for years at a time, but are subject to flash flooding during high-intensity storms

The East Walker River watershed encompasses approximately 95,650 acres within the project area, or approximately 25% of the entire watershed. Perennial creeks associated with this watershed within the project area are Virginia Creek, Dog Creek, Green Creek, Little Mormon Meadow Creek, Clearwater Creek, Bodie Creek, Atastra Creek, Rough Creek, Tributaries 2 & 4 of Rough Creek, Aurora Canyon Creek, Clark Canyon Creek, and Hot Springs Canyon Creek. Intermittent creeks associated with this watershed within the project area are East Fork of Atastra Creek, and Tributaries 1 & 3 of Rough Creek. A few named surface springs and water sources

associated with this watershed within the project area include Warm Springs, Big Alkali, Travertine Hot Springs, and Logan Spring. There are many other unnamed springs and seeps associated with this watershed within the project area. Some channels within the watershed are ephemeral and carry water only during and immediately after a rain event. Some of these channels are dry for years at a time, but are subject to flash flooding during high-intensity storms.

*Alternative 1: No Action*

*Direct and Indirect Effects*

There would be no direct effects at the watershed scale because no programmatic vegetation restoration program will be implemented. There would likely be no effects to hydrology or geomorphology in the short-term at the watershed scale.

There may be indirect effects at the watershed scale from not implementing vegetation restoration treatments. There will be ongoing fire management within the Bodie Hills project area to suppress fires to protect life and property. Fire suppression does affect the natural process, for example, without fire suppression a fire will naturally spread until burning out due to lack of fuel. The lack of naturally occurring fire within an ecosystem may lead to increased fuel loads which can then lead to large scale uncontrollable wildfires. Large scale fires will affect the watershed processes. Large, high burn severity fires can have the potential to reduce ground cover, and increase soil hydrophobicity and erosion enough to increase runoff post-fire. The removal of vegetation at a large scale will dramatically increase the sediment load into a watershed. These high severity fires could also reduce soil productivity over the long-term. Depending on the timing and/or severity of the fire, and the state of the vegetation burned, there could be beneficial and/or undesirable effects. A beneficial outcome from a large scale fire would be burning in a mosaic pattern and consuming only native vegetation resulting in desired ecological systems returning to within their natural range of variability. An undesirable outcome from a large fire would be burning through stands of pinyon invaded by cheatgrass resulting in a complete type conversion to cheatgrass. Also, if the fire burned in riparian areas, streambanks would be destabilized through removal of vegetation, water flow would increase if a large portion of any watershed is burned, and in some areas, creeks would likely either incise or have large inputs of sediment, which could alter channel location.

There may be ongoing vegetation management on a case by case basis in the Bodie Hills project area to treat plant communities at a smaller scale. This in turn may help to protect the watershed from catastrophic events, like a large scale fire.

*Cumulative Effects*

The geographic scope of the cumulative effects analysis area encompasses the Mono Lake and East Walker River watersheds. Past, present, and reasonably foreseeable future actions within these two watersheds include fire; fire suppression; mining; agriculture and livestock grazing; dams, reservoirs, and water diversions; paved road, unpaved road, and parking lot development; recreation; vegetation management projects; and residential and commercial development. Current conditions in the project area result from a multitude of natural events and human actions that have taken place over many decades. These identified actions all cause or have caused some form of soil disturbance, and vegetation disturbance or loss in the footprint of the

activity. Therefore, these actions have and will continue to negatively contribute to the cumulative effects in these two watersheds.

There are no cumulative effects on watershed processes due to past or current actions for the No Action Alternative because all the current and past management in the Bodie Hills is part of the analysis of the direct and indirect effects. The actions described above are reasonably foreseeable future actions that have potential to add cumulative effects to watershed processes when combined with the No Action Alternative. The No Action Alternative is to not implement a landscape scale programmatic vegetation restoration program which is to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire. Therefore, this may have an adverse effect cumulatively on the two watersheds.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

There would be direct and indirect effects at the watershed scale with implementation of the Proposed Action. Negative direct effects include the removal of vegetation and soil disturbance. Negative indirect effects include the persistence of bare soil that may be susceptible to erosion. However, design features will be used to minimize negative effects of the treatments on resources. Design features will also be used to meet Timber Waiver Category 2 of the California Regional Water Quality Control Board Lahontan Region.

The vegetation types targeted for treatment are primarily the upland types that were found to be at the greatest departure from their natural range of variability and at the greatest risk of conversion to uncharacteristic classes. The treatments in riparian systems that are included are only those that will also be used in adjacent or surrounding uplands and can be applied continuously across both ecological systems.

The Proposed Action is to only allow 10% of the project area to be treated (16,930 acres) over a 10 year period and treatments will most likely be apportioned between the two watersheds. Therefore, effects will be less than 10% at the watershed scale over a 10 year period. In context of the two watersheds which equate to a sum total of 887,040 acres, the Proposed Action only affects 2% of the land within the watershed over a 10 year period.

The Proposed Action should only have minor and short term negative effects to water quality and soils (with implementation of the design features) due to the minor ground disturbance. This minor ground disturbance, including prescribed fire, removing and/or thinning increasing pinyon and juniper, pile burning, establishing fuel breaks along existing roads, and restoration of depleted sagebrush through mowing could slightly increase soil compaction, soil disturbance, and runoff, but at such a low level that the effects would be immeasurably small.

Where prescribed fire is used in most cases the fire will be contained using low impact techniques during seasons when the risk of spread is very low. It is possible that, where necessary, hand lines may be constructed to contain the fire. Under the design features incorporated into all the alternatives, hand lines will be recountoured or waterbarred where there is a risk of erosion. This should ensure that fire lines do not increase soil erosion. The burning of

piles may lead to patches of bare soil as the heat from the fire could temporarily sterilize the soil surface. Vegetation is likely to recolonize within three growing seasons.

Existing roads within the project area will be used for project work, but the work should not alter their level of compaction or erosion because the roads are already disturbed, compacted, and devoid of vegetation.

While large, high burn severity fires can have the potential to increase soil hydrophobicity and reduce ground cover enough to increase runoff post-fire, any prescription burn should not have that affect.

Without implementation of this project, the area would become more susceptible to a large scale wildfire than if the project was implemented. Large scale fires will affect the watershed processes. Large, high burn severity fires can have the potential to reduce ground cover, and increase soil hydrophobicity and erosion enough to increase runoff post-fire. The removal of vegetation at a large scale will dramatically increase the sediment load into a watershed. These high severity fires could also reduce soil productivity over the long-term.

*Cumulative Effects*

There are historic mining sites, agriculture, livestock grazing, dams, reservoirs, water diversions, roads, parking lots, and residential and commercial developments within these watersheds, all of which cause or have caused some form of soil disturbance, and vegetation disturbance or loss in the footprint of the activity. The Proposed Action would add another small layer of disturbance within these two watersheds. However, because the direct and indirect effects of the Proposed Action at the watershed scale are minor, local, and short-term, the cumulative effects should also be minor, local, and short-term.

No roads would be created during this project. However, there could be some minor, local and temporary soil displacement with general off-road travel by mechanized equipment, and therefore soil displacement and compaction should be local and very minor. There will be a minor and small addition of soil disturbance due to fire lines. This disturbance may have local negative effects to soil productivity with potential for runoff, but these effects should be short-term and will overall pose no threat to the watersheds' productivity.

Removal of vegetation in a watershed can temporarily increase runoff and streamflow affecting water quality, though the small amount of vegetation removal in this project (less than 10% of any watershed over a 10 year period) does not have the potential to affect streamflow. Therefore, there should only be measurably small contributions to cumulative effects in these watersheds.

The Proposed Action may have very minor, local adverse effects to stream morphology, but they should be small and localized that they cannot have any measurable cumulative effects when added to other disturbance in the entire watershed. The few areas of stream that could have some very slight disturbance due to this project will have no effect on overall stream function or hydrology, and therefore there will be no added disturbance to what currently exists.

The Proposed Action would reduce the risk of a catastrophic wildfire, decreasing the risk of soil degradation from loss of vegetation cover, water repellency, and off-site erosion and stream sedimentation that could affect the watershed process.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The increased acreage alternative is similar to the Proposed Action with some targets for acres of treatment increased. The increased acreage alternative increases the total amount of treatment by 40% of the Proposed Action (23,880 acres). In context of the two watersheds which equate to a sum total of 887,040 acres, the increase acreage alternative only affects 3% of the land within the watershed over a 10 year period. The effects of the increase acreage alternative will be the same as the Proposed Action. There would be a slight increase of direct and indirect effects at the watershed scale as compared to the Proposed Action. However, the negative effects will be localized, minor and short term as described above in the Proposed Action. This alternative's beneficial effects will increase acreage to maintain and restore the natural range of variability and further reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the increase acreage alternative are similar to the Proposed Action. This alternative may have increased adverse effects due to the increased acreage of vegetation treatments as compared to the Proposed Action. However, the benefit of treating more acres may decrease the potential of having a catastrophic event, like a wildfire.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The Reduced Acreage Alternative lowers the total amount of treatment to 61% of the Proposed Action (10,268 acres). In context of the two watersheds which equate to a sum total of 887,040 acres, the reduced acreage alternative only affects 1% of the land within the watershed over a 10 year period. Methods and design criteria are the same as the Proposed Action. The effects of the reduced acreage alternative will be the same as the Proposed Action. There would be a slight decrease of negative direct and indirect effects at the watershed scale as compared to the Proposed Action. As with the Proposed Action, the negative effects will be localized, minor and short term. This alternative will not be as beneficial as the Proposed Action because of the decrease in acres treated to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the reduced acreage alternative are similar to the Proposed Action. This alternative may have decreased adverse effects due to the decreased acres of treated vegetation as compared to the Proposed Action. However, the benefit of treating some acres may decrease the potential of having a catastrophic event, like a wildfire.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

This Alternative lowers the total amount of treatment to 76% of the Proposed Action (12,903 acres) and design criteria are the same as the Proposed Action. In context of the two watersheds which equate to a sum total of 887,040 acres, the Limited Treatment in WSAs alternative only affects 1% of the land within the watershed over a 10 year period. The effects of this alternative will be the same as the Proposed Action. There would be a slight decrease of negative direct and indirect effects at the watershed scale as compared to the Proposed Action. As with the Proposed Action, the negative effects will be localized, minor and short term. This alternative will not be as beneficial as the Proposed Action because of the decrease in acres treated to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the Limited Treatment in WSAs alternative are similar to the Proposed Action. This alternative may have decreased adverse effects due to the decreased acres of treated vegetation as compared to the Proposed Action. However, the benefit of treating some acres may decrease the potential of having a catastrophic event, like a wildfire.

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

This Alternative lowers the total amount of treatment to 67% of the Proposed Action (11,288 acres) and design criteria are the same as the Proposed Action. In context of the two watersheds which equate to a sum total of 887,040 acres, the no treatments in WSAs alternative only affects 1% of the land within the watershed over a 10 year period. The effects of this alternative will be the same as the Proposed Action. There would be a slight decrease of negative direct and indirect effects at the watershed scale as compared to the Proposed Action. As with the Proposed Action, the negative effects will be localized, minor and short term. This alternative will not be as beneficial as the Proposed Action because of the decrease in acres treated to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the no treatments in WSAs alternative are similar to the Proposed Action. This alternative may have decreased adverse effects due to the decreased acres of treated vegetation as compared to the Proposed Action. However, the benefit of treating some acres may decrease the potential of having a catastrophic event, like a wildfire.

## Ecosystem Services:

***16. Will the project affect the values and services offered by pinyon woodlands in the Bodie Hills including wildlife habitat and corridors, fall and winter food source, carbon sequestration, and genetic pool?***

*Background*

The effects of treatment of pinyon woodlands on wildlife including corridors and winter food sources are addressed above in Issues 4, 12 and 13 and below. The additional effects on carbon sequestration and the genetic pool are discussed below.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Taking No Action may increase the risk of larger, more intensive fires. This could result in the loss of values and services that are offered by pinyon woodlands. If pinyon trees in true woodlands are lost to fire, their value as fall or winter food source would be lost. High intensity, large fires could also result in large openings dominated by non-native annual grasses. These large openings would not provide the food and cover resources for wildlife. Additionally, as pinyon continues to infill in to sagebrush, corridors between suitable habitat patches for sagebrush adapted species would decrease. This could result in higher metabolic costs to travel between suitable patches and could also result in limited genetic diversity if individuals are unable to travel through these unsuitable patches.

Carbon sequestration in sagebrush and pinyon-juniper ecological systems is not well studied. Some studies have estimated that carbon sequestration increases with pinyon-juniper expansion into sagebrush steppe (Strand, Vierling et al. 2008; Rau, Tausch et al. 2012), however, there is a lot of uncertainty in scaling up from plot level results to the landscape. The Strand et al. study (2008) found C accumulation rates for the last 50 years in 100 hectare blocks ranged from negative to positive with an average of 3.3 g $C/m^2/yr$, a value much lower than previous estimates. The authors go on to predict that extra carbon sequestered by pinyon and juniper expansion is very likely to be lost in natural wildfires burning under extreme conditions.

In another study (Meyer 2012) expanded on earlier research (Bradley et al. 2006), and demonstrated carbon losses of 6-to over 50 fold over the long-term when the burning of sagebrush steppe resulted in conversion to annual grasslands, such as cheatgrass. Issue 5 examines the fire regimes in the Bodie Hills and research that suggests increasing fire size and intensity can be expected. The No Action alternative would result in the potential for larger, more frequent and more severe wildfire outside the range of natural variability which could lead to the huge losses in stored carbon reported by Meyer if the burned areas become dominated by cheatgrass (2012).

The gene pool for native species would not be affected by treatments under the No Action Alternative, but several indirect effects are possible. The continued expansion of pinyon and juniper into shrub sites could reduce the local seed supply for species native to those communities as the understory is out competed by the overstory trees. This has been observed in other areas of the Great Basin but experiments in the Bodie Hills show that even in dense pinyon stands that are the result of recent expansion, there is still an abundant native shrub steppe seed

bank (Matchett, Brooks et al. 2010). Increasing severe wildfires could affect the gene pool for native plant species including pinyon if enough of the area is converted to invasive annual grasses like other areas of the Great Basin.

*Cumulative Effects*

Cumulative effects for the No Action on wildlife are discussed in Issue 4, 12 and 13. There are no other actions expected to have an effect on carbon sequestration or the native plant gene pool.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

No treatments are planned in true pinyon woodlands, therefore there would be no direct impacts to these habitats that would result in loss of movement corridors or food resources. Additionally, while no treatments are planned in these woodlands, they may benefit from the overall reduced risk of wildfires that result from the planned treatments in adjacent sagebrush ecological types.

Where treatments are planned to remove pinyon, it is to remove pinyon that has infilled into sagebrush ecological types. There would be some loss of pinyon nuts as a food source for wildlife as a result of the removal of these trees, but as pinyon has increased across the Bodie Hills and the Great Basin in significant numbers over the last 130 years, and because only a small proportion of the pinyon in the project area would be treated, species dependent on pinyon would have resources nearby to use. Additionally, the trees that are infilling into sagebrush are generally smaller and younger than the trees found in the true pinyon woodland ecological type. These trees typically produce fewer pinyon seeds that wildlife would rely on for fall and winter foods.

Wildlife corridors would improve for sagebrush obligate species as treatments would remove pinyon trees. Some species, such as sage-grouse and pygmy rabbit avoid areas where pinyon has moved into sagebrush. Removal of these trees would improve movement corridors for these species. Additionally, any treatments are planned to mimic natural conditions, creating a mosaic that would not create a barrier to wildlife movement by leaving openings that are too large for wildlife to find cover in.

Carbon sequestration would not be likely to be affected. The amount of treatment may offset the slow increase in carbon storage that has been observed in some studies of pinyon-juniper expansion (Strand, Vierling et al. 2008), but will not be enough to reduce it. By helping to moderate the fire regime (see Issue 5) the Proposed Action will likely help to prevent large losses in carbon storage due to severe wildfires and replacement of native ecological systems with non-native annual grasses.

*Cumulative Effects*

Cumulative effects for the Proposed Action on wildlife are discussed in issue 4, 12 and 13. There are no cumulative effects expected for carbon sequestration or the native gene pool.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Impacts from the increased acreage alternative would be similar to those discussed in the Proposed Action. More pinyon would be removed, potentially increasing short-term impacts to species dependent on pinyon. Long-term, benefits would be slightly increased with more conifer removal and other treatments resulting in a decreased risk of wildfire.

The amount of pinyon removal would still not be enough to affect carbon sequestration or the native plant gene pool. The beneficial effects through the decreased risk of wildfire would be greater (see Issue 5).

*Cumulative Effects*

Cumulative effects are the same as the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

Impacts from the WUI alternative would be similar to those discussed in the Proposed Action. Less pinyon would be removed, potentially decreasing short-term impacts to species dependent on pinyon. Long-term, benefits would be slightly decreased with fewer conifers removed and less treatments in other ecological systems. Fewer treatments could result in an increased risk of wildfire, therefore increasing the potential for fires to create larger openings and remove more pinyon.

Effects to carbon sequestration and the native plant gene pool would be essentially the same as the Proposed Action since the amount of pinyon removal is not enough in either one to cause a net loss in carbon storage or genetic diversity. The WUI Alternative would be less effective at lowering the risk of severe wildfire so indirectly there is a greater risk of loss of carbon storage and genetic diversity due to repeated severe wildfires.

*Cumulative Effects*

The cumulative effects are the same as the Proposed Action.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

Impacts from the Limited Treatment in WSA Alternative would be similar to those discussed in the Proposed Action. Less pinyon would be removed, potentially decreasing short-term impacts to species dependent on pinyon. Long-term, benefits would be slightly decreased with fewer conifers removed and less treatments in other ecological systems. Fewer treatments could result in an increased risk of wildfire, therefore increasing the potential for fires to create larger openings and remove more pinyon. This alternative is slightly better than Alternative 4 because it treats more acres, but slightly worse than the Proposed Action.

*Cumulative Effects*

Cumulative effects are the same as the Proposed Action.

*Alternative 6: No Treatment in WSAs*

*Direct, Indirect and Cumulative Effects*

Impacts from the No Treatment in WSAs Alternative would be the same as Alternative 4 the WUI Alternative because they treat a very similar number of acres.

## Air Quality:

***17. How will the project affect air quality in the Mono Basin and Bodie State Historic Park?***

Background

This analysis will discuss the potential air quality impacts to all the sensitive areas near the project including the Mono Basin and Bodie State Historic Park.

Particulate matter pollution is the regulated air pollution component that could be affected by project activities, primarily prescribed burning. Particulate matter is regulated for two different size classes; PM-10 and PM-2.5. Prescribed burning mostly generates PM-2.5 material. PM-10 is mostly from dust sources.

The project area is in the Great Basin Unified Air Pollution Control District (GBUAPCD) which includes all of Inyo, Mono, and Alpine Counties in California. The part of the project area that is in the Mono Basin hydrologic unit is a federal non-attainment zone for PM-10 due to blowing dust from the dry lakebed created by water diversions by the Los Angeles Department of Water and Power. The entire air district is a non-attainment zone for PM-10 according to State standards. Since PM-10 is the species of particulate matter that is in non-attainment, the analysis and calculations for each Alternative will focus on PM-10. The GBUAPCD requires estimation of the amount of PM-10 to be produced for every burn permit and their standard procedures for the calculations will be used.

Smoke sensitive sites near the project area include the communities of Bridgeport, Lee Vining, and Mono City, the Mono Basin Scenic Area, Bodie State Historic Park, and the nearby Class 1 Airsheds in the Ansel Adams Wilderness, Hoover Wilderness, and Yosemite National Park.

Prevailing transport winds are from the west or southwest. Because of this the emissions from the project area are unlikely to affect the Class 1 airsheds to the west and this analysis will not discuss them further.

Air settlement from the project area into the surrounding valleys could lead to impacts in the smoke sensitive communities, Bodie Bowl and the Mono Basin, so those sensitive areas will be the focus of the analysis.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action Alternative there would be no project related air quality impacts because there would be no prescribed burning or dust from project activities. However, the risk of large fires in the Bodie Hills is greater under the No Action Alternative (see Issue #5). Wildfire smoke is responsible for most of the 20% worst air quality days in the nearby Class 1 airsheds ((CalEPA

ARB2009). Wildfires in the Bodie Hills may impact the smoke sensitive communities and the Mono Basin Scenic Area especially due to air settlement at night. The Bodie State Park would be the most likely to have large air quality affects from wildfires. These effects would typically last from one day to three days or a week. Most shrubland fires are shorter lived than the timber fires on the west side of the Sierra Nevada that can last for months.

*Cumulative Effects*

The cumulative effects analysis area for air quality is the entire airshed around the project area including any areas that may contribute air pollution to the smoke sensitive sites that have been identified.

The largest contributor to PM-10 air pollution in any part of the project area is the blowing dust from the exposed lake bed around the edge of Mono Lake. The lake bed was exposed because of water diversions from the basin by the Los Angeles Department of Water and Power. The non-attainment area in the Mono Basin is due to this dust source (GBUAPCD1995). In 1994 the State Water Resources Control Board approved a decision to limit diversions until the lake level comes up to 6,391 ft. elevation. The State Implementation Plan to reduce PM-10 dust also depends on raising the lake level. Progress has been made depending on the annual hydrologic conditions since 1994. The lake level reached 3685 ft. in 1999 and 2006. The PM-10 levels have been changing with the lake level, but they still exceed the state standard. It is currently projected that the lake levels will not reach 6,391 until 2021 under normal runoff levels (Great Basin Unified Air Pollution Control Distict 2010). The dust from the shores of Mono Lake would be expected to have a downward trend with year to year variability until it meets state standards in approximately 2021.

The air quality in the cumulative effects analysis area is strongly influenced by the areas to the west of the Sierra crest because of the prevailing wind patterns. The primary contributor to PM-10 and PM-2.5 air pollution from west of the crest is wildfires on the west side of the Sierra Nevada in timbered ecosystems (CalEPA ARB2009). Wildfires in this area are also expected to increase in the future (see Issue #5).

There may be a cumulative impact to air quality from the Mono Lake dust combined with PM-2.5 emissions from increasing wildfires both in the western Sierra Nevada and in the project area.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action will cause some short term localized impacts to air quality below regulatory thresholds when treatments involving burning are implemented. These include broadcast burning, spot burning trees and shrubs and burning piles of slash from cutting treatments. These short term impacts to air quality should be offset by a reduction in the probability of large uncharacteristic wildfires causing much longer term and more severe impacts to air quality over the life of the project and beyond.

The amount of particulate matter that will be produced by the burn treatments can be calculated and the estimates of acreage and tons of particulate matter are shown in the tables below:

**Table 21.** Estimated annual rate of PM-10 emissions from broadcast burning for Alternative 2 (Proposed Action). Estimates are for a maximum of burning that would occur on an annual basis. Annual acres are estimated based on the Proposed Action acres eligible for treatment with broadcast burning combined with the best available information on the current state of the vegetation that might constrain the use of broadcast burning, i.e. the presence of cheatgrass, fire resistant later stages of pinyon-juniper expansion and priority sage-grouse habitat where shrubs need to be maintained. Calculations are based on the GBUAPCD Smoke Management Plan procedures.

| **Ecological System** | Estimated annual broadcast burn acres | Percent consumption goals | Acres blackened per year | Estimated tons of fuel per acre | Emission Value: Tons PM-10 per Ton of Fuel | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|---|---|---|---|
| **Basin Wildrye Big Sagebrush** | 5.3 | 0.7 | 3.7 | 4 | 0.01 | **0.15** |
| **Low Sagebrush** | 0 | N/A | | | | |
| **Montane Sagebrush Steppe** | 712.5 | 0.7 | 498.8 | 2 | 0.01 | **9.98** |
| **Mountain Shrub** | 100 | 0.8 | 80.0 | 3 | 0.01 | **2.40** |
| **Wyoming big sagebrush - loamy** | 0 | N/A | | | | |
| **Wyoming big sagebrush - sandy** | 0 | N/A | | | | |
| **Montane Riparian** | 3 | 0.8 | 2.4 | 10 | 0.007 | **0.17** |
| **Stable Aspen** | 26.7 | 0.9 | 24.0 | 5 | 0.007 | **0.84** |
| **Wet Meadows** | 10 | 0.6 | 6.0 | 1 | 0.004 | **0.02** |
| **Total** | 857.5 | | | | | **13.56** |

**Table 22.** Estimates of the maximum emissions from pile burning on an annual basis for Alternative 2 (Proposed Action). Actual values could be lower because some of these acres could actually be treated by mowing which does not have significant PM-10 emissions. Calculations are based on the GBUAPCD Smoke Management Plan procedures.

| Ecological System | Estimated annual pile burn acres | Estimated pile density | tons of PM-10 per pile (for 6 ft diameter by 5 ft high piles) | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|---|---|
| **Basin Wildrye Big Sagebrush** | 5 | 20 | 0.002 | **0.20** |
| **Low Sagebrush** | 125 | 20 | 0.002 | **5.00** |
| **Montane Sagebrush Steppe** | 90 | 20 | 0.002 | **3.60** |
| **Mountain Shrub** | 0 | N/A | | |
| **Wyoming big sagebrush - loamy** | 38.2 | 20 | 0.002 | **1.53** |
| **Wyoming big sagebrush - sandy** | 1.2 | 20 | 0.002 | **0.05** |
| **Montane Riparian** | 0 | N/A | | |
| **Stable Aspen** | 22.3 | 20 | 0.002 | **0.89** |
| **Wet Meadows** | 0 | N/A | | |
| **Total** | 281.7 | | | **11.27** |

The calculations above show that the project will produce less than 25tons of PM-10 per year. This is less than 0.5% of the PM-10 emissions from area sources for Mono County in the California Regional Haze Plan (5350 tons/year) and less than 0.02% of PM-10 emission for area sources in the Sierra Region in the Plan (129838 tons/year).

All prescribed burning will be done with a permit and smoke management plan approved by the GBUAPCD for the day of ignition. The smoke management plan ensures that the project is not expected to have adverse effects on air quality in violation of standards set by the state.

All prescribed burning will be conducted according to a burn plan written by a qualified burn boss and reviewed by a second qualified individual. The plan will specify the atmospheric and fuels conditions necessary to achieve the desired conditions and provide for adequate dispersal of the smoke away from smoke sensitive communities. Before ignition the burn boss will conduct a Go-No Go check list to ensure that the prescription will be met and all necessary authorizations, protections, and contingencies are in place. Ignition will start with a test burn to verify burning conditions and smoke transport. If the burn boss observes smoke transport into smoke sensitive locations there will be no more ignition and the burn will be controlled using the available techniques.

Smoke sensitive sites are unlikely to be affected during ignition because of these protections. During the night downslope air flow can carry smoke into the low lying areas such as the Bodie Bowl, the Bridgeport Valley, and the Mono Basin. This could be an irritant to sensitive individuals such as those with respiratory ailments. The Smoke Management Plan approved by the GBUAPCD will ensure that these effects are not likely to violate rule 402. Monitoring after the burns will verify that this is true so that adjustments can be made to ensure compliance. The BIFO has a good record in the past with prescribed burning.

If there is smoke settlement in the Bodie Bowl during the evening, it will not affect visitors who are primarily there during the day. However, there are park staff who live on site who could be affected. The BLM will coordinate with the State Park when doing prescribed burns in the Bodie Bowl area.

In summary, the amounts of PM-10 and PM-2.5 emissions from the project are expected to be minor compared to other sources in the area and not to exceed standards.

The project is likely to reduce the probability of large severe wildfires in the project area (see Issue #4). This could have a much larger effect on air quality than the prescribed burning in the Proposed Action. Wildfires typically produce twice as much PM-10 during burning compared to prescribed fire, and the wildfires would be much larger and of a longer duration than the prescribed fires . In addition, wildfires are not strategically located and ignited under favorable conditions to avoid impacts to smoke sensitive areas. Therefore, they are more likely to have impacts on these smoke sensitive locations.

*Cumulative Effects*

The GBUAPCD burn permitting process ensures that there will not be cumulative effects on a daily basis due to other permitted activities in the area. The other sources of particulate matter in

the airshed discussed in the analysis of the No Action Alternative will also be present, such as dust from the exposed lakebed at Mono Lake and wildfires on the west side of the Sierra Nevada. The Mono Lake dust is expected to have a declining trend and smoke from wildfires on the west slope of the Sierra Nevada is expected to have an upward trend. The small amount contributed from project activities will not be significant compared to these two competing trends. Smoke from prescribed burning will also typically come in a different season from wildfire smoke from the west slope of the Sierra Nevada.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The Increased Acreage alternative will generate about three times more short term and localized air impacts during burning of biomass than the Proposed Action because it relies heavily on prescribed burning to achieve increased acres of treatment, but these would always be maintained below regulatory thresholds. The Alternative would have a better chance of reducing the probability of larger effects due to large uncharacteristic wildfires that have longer term and widespread smoke impacts across the region. The calculations of the particulate matter that would be directly produced by the treatments are shown in the tables below:

**Table 23.** Estimated annual rates of PM-10 emissions from broadcast burning for Alternative 3 (Increased Acreage). Estimates are for a maximum of burning that would occur on an annual basis. Annual acres are estimated based on the Proposed Action acres eligible for treatment with broadcast burning combined with the best available information on the current state of the vegetation that might constrain the use of broadcast burning, i.e. the presence of cheatgrass, fire resistant later stages of pinyon-juniper expansion and priority sage-grouse habitat where shrubs need to be maintained. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| **Ecological System** | Estimated annual broadcast burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 10.2 | **0.29** |
| **Low Sagebrush** | 0 | |
| **Montane Sagebrush Steppe** | 922.5 | **12.92** |
| **Mountain Shrub** | 100 | **2.40** |
| **Wyoming big sagebrush - loamy** | 0 | |
| **Wyoming big sagebrush - sandy** | 0 | |
| **Montane Riparian** | 3 | **0.17** |
| **Stable Aspen** | 26.7 | **0.84** |
| **Wet Meadows** | 10 | **0.02** |
| **Total** | 1072.4 | **16.63** |

**Table 24.** Estimates of the maximum emissions from pile burning on an annual basis for Alternative 3 (Increased Acreage). Actual values could be lower because some of these acres could actually be treated by mowing which does not have significant PM-10 emissions. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| Ecological System | Estimated annual pile burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 5 | **0.20** |
| **Low Sagebrush** | 220 | **8.80** |
| **Montane Sagebrush Steppe** | 155 | **6.20** |
| **Mountain Shrub** | 0 | |
| **Wyoming big sagebrush - loamy** | 153 | **6.12** |
| **Wyoming big sagebrush - sandy** | 1.2 | **0.05** |
| **Montane Riparian** | 0 | |
| **Stable Aspen** | 22.3 | **0.89** |
| **Wet Meadows** | 0 | |
| **Total** | 1404.7 | **56.19** |

The calculations above show that the project will produce less than 73tons of PM-10 per year. This is an increase over the Proposed Action of 292%, but it is still less than 1.4% of the PM-10 emissions from area sources for Mono County in the California Regional Haze Plan (5350 tons/year) and 0.2% of PM-10 emission for area sources in the Sierra Region in the Plan (129838 tons/year). The majority of the particulate matter in the budgets reported in the Sierra Region is due to wildfire smoke.

Under the Increased Acreage Alternative, there would be a much better likelihood that the treatments would be able to reduce the likelihood and size of future wildfires outside the range of natural variability (See Issue #4).

The prescribed burning under this alternative would follow all the same procedures, prescriptions, and permitting process as the Proposed Action to limit negative impacts on smoke sensitive communities (See analysis under the Proposed Action for a full description). Some smoke settlement would be expected in smoke sensitive communities that could be an irritant to vulnerable individuals. The number of nights when this might occur would be greater than under the Proposed Action because of the great number of units to be treated annually.

The increased number of nights with potential for smoke settlement in communities would be offset by the much greater reduction in the likelihood of severe wildfire smoke impacts.

*Cumulative Effects*

The GBUAPCD burn permitting process ensures that there will not be cumulative effects on a daily basis due to other permitted activities in the area. The other sources of particulate matter in the airshed discussed in the analysis of the No Action Alternative will also be present, dust from the exposed lakebed at Mono Lake and wildfires on the west side of the Sierra Nevada. The Mono Lake dust is expected to have a declining trend and smoke from wildfires on the west

slope of the Sierra Nevada is expected to have an upward trend. The small amount contributed from project activities will not be significant compared to these two competing trends. The reduction in the likelihood of severe wildfires in the Bodie Hills Landscape may have a small positive cumulative effect in combination with the declining dust production from exposed Mono Lake shores resulting in overall improved air quality in the Mono Basin.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

Under the CWPP WUI Alternative, there would be a smaller amount of particulate matter produced directly from the treatments, but the amount of treatment would be below the threshold likely to be able to reduce severe wildfires therefore the overall air quality impacts may be greater than the Proposed Action. The particulate matter produced from the treatments is summarized in the tables below:

**Table 25.** Estimated annual rates of PM-10 emissions from broadcast burning for Alternative 4 (CWPP WUI Only). Estimates are for a maximum of burning that would occur on an annual basis. Annual acres are estimated based on the Proposed Action acres eligible for treatment with broadcast burning combined with the best available information on the current state of the vegetation that might constrain the use of broadcast burning, i.e. the presence of cheatgrass, fire resistant later stages of pinyon-juniper expansion and priority sage-grouse habitat where shrubs need to be maintained. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| **Ecological System** | Estimated annual broadcast burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 3.6 | **0.10** |
| **Low Sagebrush** | 0 | |
| **Montane Sagebrush Steppe** | 421.5 | **5.90** |
| **Mountain Shrub** | 85 | **2.04** |
| **Wyoming big sagebrush - loamy** | 0 | |
| **Wyoming big sagebrush - sandy** | 0 | |
| **Montane Riparian** | 2.7 | **0.15** |
| **Stable Aspen** | 12.3 | **0.39** |
| **Wet Meadows** | 6.6 | **0.02** |
| **Total** | 531.7 | **8.60** |

**Table 26.** Estimates of the maximum emissions from pile burning on an annual basis for Alternative 4 (CWPP WUI Only). Actual values could be lower because some of these acres could actually be treated by mowing which does not have significant PM-10 emissions. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| Ecological System | Estimated annual pile burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 3.4 | **0.14** |
| **Low Sagebrush** | 61.5 | **2.46** |
| **Montane Sagebrush Steppe** | 60 | **2.40** |
| **Mountain Shrub** | 0 | |
| **Wyoming big sagebrush - loamy** | 38.2 | **1.53** |
| **Wyoming big sagebrush - sandy** | 88.5 | **3.54** |
| **Montane Riparian** | 0 | |
| **Stable Aspen** | 21.7 | **0.87** |
| **Wet Meadows** | 0 | |
| **Total** | 273.3 | **10.93** |

The calculations above show that the project will produce less than 20 tons of PM-10 per year. This is 80% of the amount estimated for the Proposed Action. It is less than 0.4% of the PM-10 emissions from area sources for Mono County in the California Regional Haze Plan (5350 tons/year) and 0.015% of PM-10 emission for area sources in the Sierra Region in the Plan (129838 tons/year).

The prescribed burning under this alternative would follow all the same procedures, prescriptions, and permitting process as the Proposed Action to limit negative impacts on smoke sensitive communities (See analysis under the Proposed Action for a full description). Some smoke settlement would be expected in smoke sensitive communities that could be an irritant to vulnerable individuals. The number of nights when this might occur would be slightly less than under the Proposed Action because of the lower total acres that would be treated. However, the location of those treatments is closer to the smoke sensitive communities so there may actually be no difference from the Proposed Action.

The majority of area sources for both Mono County and the Sierra Region are wildfires. The CWPP WUI Alternative is below the threshold expected to be able to limit severe wildfires in the Bodie Landscape so the overall effect of the Alternative would be increased impacts on air quality from severe wildfires which are expected to increase in the future without action (See Issue #4).

*Cumulative Effects*

The GBUAPCD burn permitting process ensures that there will not be cumulative effects on a daily basis due to other permitted activities in the area. The other sources of particulate matter in the airshed discussed in the analysis of the No Action Alternative will also be present, in the form of dust from the exposed lakebed at Mono Lake and wildfires on the west side of the Sierra Nevada. The Mono Lake dust is expected to have a declining trend and smoke from wildfires on

the west slope of the Sierra Nevada is expected to have an upward trend. The small amount contributed from project activities will not be significant compared to these two competing trends. The increase in the likelihood of severe wildfires in the Bodie Hills Landscape may have a small negative cumulative effect in combinations with the other sources resulting in reduced air quality in the airshed.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

Under the Limited Treatment in WSAs Alternative there would be a smaller amount of particulate matter produced directly from the treatments, but the amount of treatment would be below the threshold likely to be able to reduce severe wildfires therefore the overall air quality impacts may be greater than the Proposed Action. The particulate matter produced from the treatments is summarized in the tables below:

**Table 27.** Estimated annual rates of PM-10 emissions from broadcast burning for Alternative 5 (Limited Treatment in WSAs). Estimates are for a maximum of burning that would occur on an annual basis. Annual acres are estimated based on the Proposed Action acres eligible for treatment with broadcast burning combined with the best available information on the current state of the vegetation that might constrain the use of broadcast burning, i.e. the presence of cheatgrass, fire resistant later stages of pinyon-juniper expansion and priority sage-grouse habitat where shrubs need to be maintained. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| **Ecological System** | Estimated annual broadcast burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 4.7 | **0.13** |
| **Low Sagebrush** | 0 | |
| **Montane Sagebrush Steppe** | 519.8 | **7.28** |
| **Mountain Shrub** | 100 | **2.40** |
| **Wyoming big sagebrush - loamy** | 0 | |
| **Wyoming big sagebrush - sandy** | 0 | |
| **Montane Riparian** | 2.8 | **0.16** |
| **Stable Aspen** | 20 | **0.63** |
| **Wet Meadows** | 10 | **0.02** |
| **Total** | 657.3 | **10.62** |

**Table 28.** Estimates of the maximum emissions from pile burning on an annual basis for Alternative 5 (Limited Treatment in WSAs). Actual values could be lower because some of these acres could actually be treated by mowing which does not have significant PM-10 emissions. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| Ecological System | Estimated annual pile burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 4.5 | **0.18** |
| **Low Sagebrush** | 66.5 | **2.66** |
| **Montane Sagebrush Steppe** | 65 | **2.60** |
| **Mountain Shrub** | 0 | |
| **Wyoming big sagebrush - loamy** | 36.7 | **1.47** |
| **Wyoming big sagebrush - sandy** | 1.2 | **0.05** |
| **Montane Riparian** | 0 | |
| **Stable Aspen** | 17.5 | **0.70** |
| **Wet Meadows** | 0 | |
| **Total** | 191.4 | **7.66** |

The calculations above show that the project will produce about 18 tons of PM-10 per year. This is 72% of the amount estimated for the Proposed Action. It is 0.3% of the PM-10 emissions from area sources for Mono County in the California Regional Haze Plan (5350 tons/year) and 0.014% of PM-10 emission for area sources in the Sierra Region in the Plan (129838 tons/year).

The prescribed burning under this alternative would follow all the same procedures, prescriptions, and permitting process as the Proposed Action to limit negative impacts on smoke sensitive communities (See analysis under the Proposed Action for a full description). Some smoke settlement would be expected in smoke sensitive communities that could be an irritant to vulnerable individuals. The number of nights when this might occur would be slightly less than under the Proposed Action because of the lower total acres that would be treated.

The majority of area sources for both Mono County and the Sierra Region are wildfires. The Limited Treatment in WSAs Alternative is below the threshold expected to be able to limit severe wildfires in the Bodie Landscape so the overall effect of the Alternative would be increased impacts on air quality from severe wildfires which are expected to increase in the future without action (See Issue #4).

*Cumulative Effects*

The effects of this alternative are not substantially different from the CWPP WUI Alternative and the cumulative effects are the same. See above for the full analysis.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

Under the No Treatment in WSAs Alternative, there would be a smaller amount of particulate matter produced directly from the treatments, but the amount of treatment would be below the threshold likely to be able to reduce severe wildfires therefore the overall air quality impacts may

be greater than the Proposed Action. The particulate matter produced from the treatments is summarized in the tables below:

**Table 29.** Estimated annual rates of PM-10 emissions from broadcast burning for Alternative 6 (No Treatment in WSAs). Estimates are for a maximum of burning that would occur on an annual basis. Annual acres are estimated based on the Proposed Action acres eligible for treatment with broadcast burning combined with the best available information on the current state of the vegetation that might constrain the use of broadcast burning, i.e. the presence of cheatgrass, fire resistant later stages of pinyon-juniper expansion and priority sage-grouse habitat where shrubs need to be maintained. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| **Ecological System** | Estimated annual broadcast burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 4.6 | **0.13** |
| **Low Sagebrush** | 0 | |
| **Montane Sagebrush Steppe** | 426 | **5.96** |
| **Mountain Shrub** | 93 | **2.23** |
| **Wyoming big sagebrush - loamy** | 0 | |
| **Wyoming big sagebrush - sandy** | 0 | |
| **Montane Riparian** | 2.6 | **0.15** |
| **Stable Aspen** | 14.4 | **0.45** |
| **Wet Meadows** | 10 | **0.02** |
| **Total** | 550.6 | **8.95** |

**Table 30.** Estimates of the maximum emissions from pile burning on an annual basis for Alternative 6 (No Treatment in WSAs). Actual values could be lower because some of these acres could actually be treated by mowing which does not have significant PM-10 emissions. Calculations are based on the GBUAPCD Smoke Management Plan procedures. Calculation factors are the same as those shown in the tables for the analysis of the Proposed Action and are not repeated here.

| Ecological System | Estimated annual pile burn acres | **Estimated PM-10 Emissions (tons/year)** |
|---|---|---|
| **Basin Wildrye Big Sagebrush** | 4.3 | **0.17** |
| **Low Sagebrush** | 64 | **2.56** |
| **Montane Sagebrush Steppe** | 55 | **2.20** |
| **Mountain Shrub** | 0 | |
| **Wyoming big sagebrush - loamy** | 36.7 | **1.47** |
| **Wyoming big sagebrush - sandy** | 1.2 | **0.05** |
| **Montane Riparian** | 0 | |
| **Stable Aspen** | 12.6 | **0.50** |
| **Wet Meadows** | 0 | |
| **Total** | 173.8 | **6.95** |

The calculations above show that the project will produce less than 16 tons of PM-10 per year. This is 64% of the amount estimated for the Proposed Action. It is less than 0.3% of the PM-10 emissions from area sources for Mono County in the California Regional Haze Plan (5350

tons/year) and 0.012% of PM-10 emission for area sources in the Sierra Region in the Plan (129838 tons/year).

The prescribed burning under this alternative would follow all the same procedures, prescriptions, and permitting process as the Proposed Action to limit negative impacts on smoke sensitive communities (See analysis under the Proposed Action for a full description). Some smoke settlement would be expected in smoke sensitive communities that could be an irritant to vulnerable individuals. The number of nights when this might occur would be slightly less than under the Proposed Action because of the lower total acres that would be treated.

The majority of area emission sources for both Mono County and the Sierra Region are wildfires. The No Treatment in WSAs Alternative is below the threshold expected to be able to limit severe wildfires in the Bodie Landscape so the overall effect of the Alternative would be increased impacts on air quality from severe wildfires which are expected to increase in the future without action (See Issue #4).

*Cumulative Effects*

The effects of this alternative are not substantially different from the CWPP WUI Alternative and the cumulative effects are the same. See above for the full analysis.

## Recreation:

***18. What would the effects of the treatments, especially wood gathering, be on route proliferation and off-road vehicle use and what site types would be susceptible?***

*Background*

Off Highway Vehicle (OHV) use in the Bodie Hills Management Area is limited to the designated travel and transportation system adopted under the Bishop Resource Management Plan (USDI BLM 1993a). OHV use is dispersed throughout the area with most of the activity taking place around Bodie State Park. Driving for pleasure, wildlife or wildflower viewing, exploring, hunting and camping are the primary recreational activities that take place. Vehicle use types include passenger cars, pickup trucks, SUVs, ATVs, recreation utility vehicles, jeeps, and motorcycles. There are no developed OHV recreational facilities in the Bodie Hills.
The BIFO has an agreement in place with Bodie State Parks to assist BLM enforcement officers. Because of the agreement the area is regularly patrolled by both BLM Federal Law Enforcement Officers and California State Park Rangers. BLM fire personnel additionally patrol the Bodie Hills between May and October; during winter months the area is often inaccessible to vehicles. The majority of people contacted by fire patrols in 2012 were traveling to Bodie State Park. On a number of days traveling in the Bodie Hills they did not see or contact anyone (USDI BLM 2012d).

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action Alternative there would be no direct effects on OHV use in the Bodie Hills. Without any action it is predicted that severe wildfires may become more common (see Issue 5) which could lead to increasing illegal off-road use when vegetation barriers are removed.

*Cumulative Effects*

There would be no cumulative effects because there is no other past, present or reasonably foreseeable projects that would affect OHV use in the Bodie Hills.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The proposed treatments would not encourage route proliferation or off-road vehicle use because any fire control lines that intersected existing routes would be rehabilitated and barricaded if necessary so that they would not be easily used as OHV routes. Most fire units would be implemented away from roads and under conditions that would not require disturbing the ground to create fire control lines. Mowing treatments would leave a buffer of untreated vegetation along the road to discourage vehicles from traveling off route. Susceptible sites would be those instances where treatments are applied adjacent to roads as fuel breaks. However, because this type of treatment still leaves vegetation intact, but closer to the ground, OHV users would be able to differentiate between the road tread and traveling off route. Off-road travel to gather firewood is currently prohibited and would remain so after project implementation.
Routine patrols by BLM personnel along with assistance from Bodie State Parks personnel have increased the compliance from OHV users in the Bodie Hills. As an example: On November 30, 2010 the Friends of the Inyo completed an OHV route survey of Bodie Mountain, Mount Biedeman, Bodie and Excelsior WSAs. The survey found no current route proliferation and concluded that "Many previously mapped routes were found to be self-restoring ending well before the previously mapped route…"

*Cumulative Effects*

Cumulative effects would be negligible because the treatments would not necessarily encourage route proliferation by OHVs.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Direct and indirect effects would remain the same as the Proposed Action because the methods would be the same as the Proposed Action with the exception of the addition of targeted livestock grazing around Bodie State Historic Park to reduce fuels. There is no indication that grazing in and around the Bodie Hills has led to OHV route proliferation or illegal OHV activity.

*Cumulative Effects*

Cumulative effects would remain the same as the Proposed Action because of the lack of direct and indirect effects.

*Alternatives 4, 5 and 6: Reduced Acreage Alternatives*

*Direct and Indirect Effects*

Direct and indirect effects would remain the same as the Proposed Action because the methods, method selection criteria, and design criteria are the same as the Proposed Action.

*Cumulative Effects*

Cumulative effects would remain the same as the Proposed Action because the direct and indirect effects are the same as the Proposed Action.

## Visual Quality:

***19. What will the effect of the treatments (especially mowing, cutting trees, chipping, and seeding with a rangeland drill) and the rate of vegetation regrowth be on the visual appearance of the Bodie Hills especially critical viewsheds like the Bodie State Historic Park?***

*Background*

The proposed project is evaluated for visual appearance using the Bishop RMP (USDI BLM 1993a) designated Visual Resource Management (VRM) Classes for the Bridgeport, Bodie Hills, and northern portion of the Granite Mountain Management Areas (MA) (See Figure 11 below). The project's compliance to these visual classes would utilize Key Observation Point(s) (KOP) and Visual Contrast Rating analysis which is based on the landscape character elements of form, line, color, and texture (see below for more detailed description of this analysis). The VRM Class within the WSAs is defined by the Bishop RMP visual designation for each MA (USDI BLM 1993a).

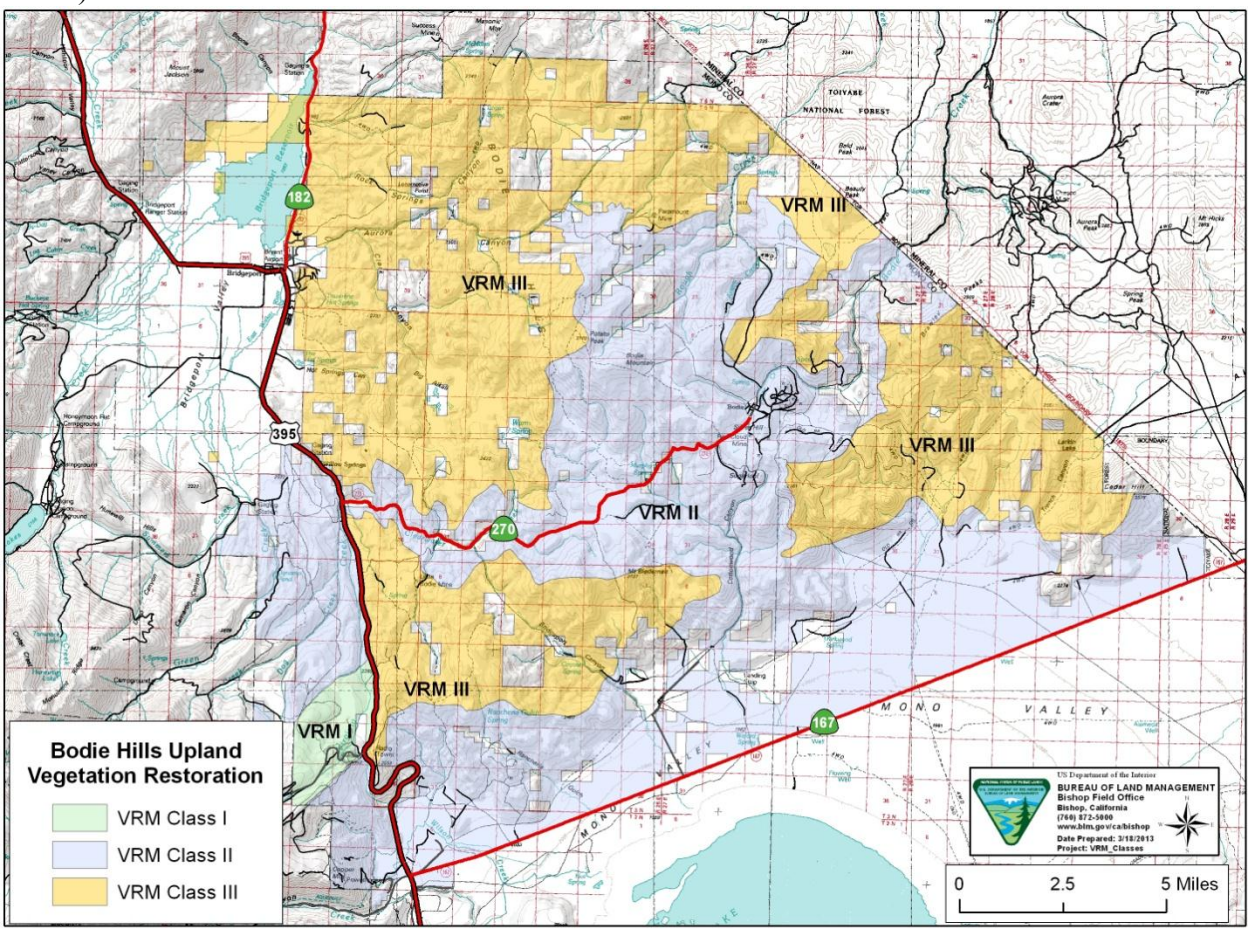



**Figure 11.** Map of Visual Resource Management Classes (VRM) for the project area as defined by the Bishop RMP (USDI BLM 1993a).

Objectives for VRM Classes I, II, III are as follows:

Class I: The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

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

Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

The Bridgeport MA has a VRM Class I rating for the Conway Summit ACEC; a VRM Class II rating for the southern portion beginning south of Green Creek road; and a VRM Class III rating for the remainder of the area. This MA has residential development around the town of Bridgeport and Virginia City, the Bridgeport Reservoir, and includes Highway 395 with associated improvements.

The Bodie Hills MA has a VRM Class II rating for the Bodie Bowl and the main travel corridors. The main travel corridors are the Bodie road, Cottonwood Canyon road, Bodie-Aurora NV road, Geiger Grade road, southern portion of the Halfway Camp road and the southern portion of the Masonic road. The MA has a VRM Class III for the remaining portion of the area. This area has three WSAs within the project area which fall into areas of both VRM Class II and VRM Class III.

Within this Management Area there are visible remnants of historic mining operations in Aurora Canyon, Cinnabar Canyon, Cottonwood Canyon, Paramount Mine area, and the area surrounding Bodie Bowl. There is some development at Conway Summit and improvements associated with Highway 395 and the utility corridor. The landscape has evidence of numerous wildfires over the years with excellent vegetative recovery except for those areas where cheatgrass has become established in the vegetative stand (See Issue #5: Fire Regime).

The Granite Mountain MA has a VRM Class II rating for the Mono Basin. The landscape has residential development at Mono City, Conway Ranch, and dispersed ranchettes near Cottonwood Canyon road and along Hwy 167. This area also includes the Cedar Hill 3,800 acre acquisition which carries use restriction covenants. This landscape has experienced wildfire over the years throughout the area (See Issue #5: Fire Regime).

The analysis of visual impacts is done using Key Observation Points (KOPs). KOPs are locations from which the casual observer has a potential view of the project. KOPs are typically the most critical viewpoints and are usually along commonly traveled routes or at other likely observation points. Exact locations of KOPS would be determined when the specific treatment area location is determined.

Potential KOPs would be located along the major travel routes through the project area including Highway 395, Highway 182, Bodie road, Cottonwood Canyon road, Bodie-Aurora NV road, Geiger Grade, southern portion of the Halfway Camp road, the southern portion of the Masonic road, Highway 167, Cottonwood Canyon road, and Alameda/Deep Wells road. In addition, potential KOPs could be established along the Aurora Canyon road, northern portion of Masonic road, northern portion of the Halfway Camp road, and Bridgeport Canyon road, and Bodie State Park proper. Other potential KOPs could include high points such as Potato Peak, Bodie Peak, Mt. Biedeman, Conway Summit scenic overlook, and the residential/public land boundaries which abut treatment areas.

It is believed that the main access to project area is along the above mentioned paved and unpaved roads, and therefore, they are the most likely locations of the KOPs. Although there are other numerous unmaintained routes throughout, these routes are infrequently used and would not meet the “commonly traveled” portion of the KOP definition. This is not to say that a KOP could not be used in these locations when actual contrast evaluation of a proposed project would be conducted.

It is recognized that individuals or small groups are using the public land in the project area for sightseeing, nature walking/hiking, wildlife viewing, hunting, and OHV travel. Most of these activities are taking place along the above mentioned paved and unpaved routes. Some of these activities may originate from the existing routes and might depart from these routes to move cross-country. The locations of these activities are not well documented. Camping does take place but it is mostly confined to disturbed areas some of which are on private property. In summary, due to the ephemeral and sporadic nature of hiking and camping, establishing KOPs based on these uses will not be done unless analysis at the individual unit level reveals a site specific need. There are no known established or recognized hiking trails on which to establish potential KOPs along such routes.

Prior to any vegetation treatment activities, a Visual Contrast Rating analysis would be conducted. The rating is based on the landscape character elements of form, line, color, and texture and is a process where any contrast between the existing landscape and the resulting landscape after treatment is determined. Contrast evaluation of the character elements would only be applied to changes in the vegetation involved in the treatments.

Contrasts in form result from changes in the shape and mass of landforms or structures. This project does not affect landforms or structures, but will introduce new shapes in the landscape from treatment units Contrasts in line generally result from changes in edge types or the introduction of edges. Contrasts in color are the strongest when new colors or hues are introduced into the landscape. Contrasts in texture generally result from differences in grain and density.

Each element is rated using a qualitative value of degree of contrast classified as None, Weak, Moderate, or Strong. The four levels of contrast roughly correspond with the VRM Classes I, II, III, and IV respectively. As an example, this means that a "strong" color contrast rating may be acceptable in a Class IV area but probably would not meet the VRM objectives for a Class III area.

The assessment takes into consideration the following human or environmental factors; viewing by a casual observer, distance from the KOP to project area, the viewing angle of the observer to the project, length of time in view, relative size or scale of the project area, season of use of the project, rehabilitation recovery time, spatial relationship, and built-in visual design features for the treatments.

In order to reduce a project's visual impact, design features are typically built into the project design or utilized in order to bring the project visual contrasts to VRM Class standards and higher (less impact). The proposed project vegetation management techniques have built-in design features which can be applied at the time that the treatment is analyzed using the Visual Contrast Rating process. All treatment design features can be found in the Design Features section of the Proposed Action (Alternative 2).

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action alternative, no vegetation treatments would be performed. The existing characteristic landscape in the project area would be maintained unless altered by wildfires (See Issue #5: Fire Regime). Since the area has a history of wildfire, it is reasonable that over time, additional wildfires will be part of and change portions of the visual landscape in the project area. Generally, visual impacts of wildfires will be similar to the impact of prescribed burns as described in the Proposed Action, except as described below.

Under the fire regime description for the No Action Alternative, it is likely that wildfire size, intensity, and frequency may increase in the project area. High intensity (wind-driven, hot fires) wildfires have the potential of considerable vegetation loss due to large acreages consumed and total consumption of the vegetation. There is a possibility of dramatic visual short and long-term effects. Based on fire intensity and size; visual impacts could range from seeing large acreages of predominately cheatgrass stands with the loss of vegetation diversity for many years, to fire scars that could extend for miles covering large acreages and visible from areas inside and well outside of the project area. In addition, a major wildfire or catastrophic fire near the Bodie Bowl could well destroy the visual aspects of the Bodie Bowl for years or the town itself.

*Cumulative Effects*

Wildfires will continue to be part of the characteristic landscape in the project area. It is likely that wildfire size, intensity, and frequency may increase in the project area. The cumulative effect would be a degradation of visual quality above the visual impacts of typical wildfires in the project area. There are no other past, present or reasonably foreseeable actions that would have a cumulative effect in combination with the No Action Alternative. Past actions have been

incorporated into the current condition as part of the analysis. There are no current projects with impacts to visual quality and there are no reasonably foreseeable projects that have been approved (see the cumulative effects discussion for Issue 1 for an analysis of potential cumulative effects and why there are none that are reasonably foreseeable.)

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

General Note: As described in the above visual background information, many factors are involved in describing the visual impact of specific vegetation treatments within the proposed project. Under this programmatic EA, the treatment areas could be located anywhere inside the project area. Each separate vegetation treatment area would be evaluated using a KOP and Visual Resource Contrast rating prior to treatment. The following is a general description of potential visual impact of the project in the short term (less than 2 years).

<u>Visual Impacts of the eight vegetation treatment methods within the general landscape</u>:
Generally for all treatments:
Where treatment areas are below or level to the KOPs, it is expected that all treatments when coupled with design features will meet all VRM Class standards. For below level, this result comes from the treatment area being either unseen (slopes descending down from observer level or below the observer) or the observer is overlooking the treatment area and typically looking towards a distant view. For treatment areas at the same plane or level of the observer, the result is that the project would be relatively unnoticed due to existing vegetative screening (shrub screening along road), and the low cross-sectional view of the treatment area. The treatment view would be as an edge rather than a full view of the treatment such as when the treatment is located on a nearby slope and in full view.

Where treatment areas are mid-slope or higher than the KOPs, it is expected that all treatments when coupled with design features will meet all VRM Class standards. Treatment areas may be out of view or partially in view due to terrain blocking the observer's view. In areas where the treatment area would be in full view, treatments that are greater than ¼ mile from the observer and less than 40 acres in size would be seen but would not attract the attention of the casual observer. In situations where the proposed treatment is less than ¼ mile away and/or greater than 40 acres, design features would be utilized to meet VRM Class standards.

Visual contrasts in proposed treatment areas would dissipate over time. It is expected that within a season to a year following treatment, vegetation regrowth and new growth would begin to reduce any contrasts that may be created by the treatments. By the second and third year regrowth would reduce any contrasts to a minimum level.

Application of some or all of the project design features as defined above can be determined when the actual visual resource contrast rating is conducted. At that time, the KOP, the exact treatment location and distance from KOP to treatment area will be defined; and the treatment technique can be custom designed to meet VRM standards for the area.

Broadcast prescribed burning
This technique when coupled with design features would meet all VRM Classes.

Broadcast prescribed burning has the potential to result in short term contrasts of form, color, texture, and line elements. See Figure 12 and Figure 13.

**Figure 12.** Photo of small batch burning technique. Most of the prescribed burning proposed would be similar to this picture. It would be done in small patches under conditions when fire lines are not necessary for control. (Photo credit: Santa Rosa Ranger District, Humboldt-Toiyabe National Forest)

**Figure 13.** Photo of one year after use of small patch burning technique. The same area shown in the figure above, one year later. The burnt patches are already well vegetated and have natural boundaries. (Photo credit: Santa Rosa Ranger District, Humboldt-Toiyabe National Forest)

In the characteristic landscape for this treatment, form tends to be a flat to rolling surface with relatively large stands of sagebrush or sagebrush-bitterbrush canopies covering the terrain. In certain areas this landscape would also have mosaic patterns resulting from intermixed communities of low sagebrush, dry or wet meadows or pinyon-juniper. Prescribed burning would create a contrast of form where the treatment area results in smaller patches of open areas having

a lower surface height (shrubs canopy removed) compared with the surrounding vegetation. Where the landscape has intermixed low sage communities or dry or wet meadows, these openings would mimic the characteristic landscape. Depending on treatment size, terrain location, and distance from the KOP, this form contrast would be weak to moderate.

In the characteristic landscape color ranges from sage green and dark green of vegetation communities to the grey, gray-black, or red-brown of rock outcrops and shadow areas. Prescribed burns would result in a grey to black color and could have tan components from exposed soil for a short time until vegetation begins to regrow. In most locations grasses will begin to grow obscuring the black within a month of treatment. Some remnant vegetation due to incomplete burns would maintain patches of sage green. Depending on treatment size, terrain location, and distance from the KOP, this color contrast would be weak to moderate.

In the characteristic landscape texture ranges from grainy or uneven from the varying heights/spacing of shrub canopies and tree stands, to uniform or smooth in meadows, or blocky or angular from rock surfaces or rock outcrops. After a prescribed burn the area texture will tend to be smooth and even, or rough where shrubs or trees are partially burned or left unburned adding a vertical component which was not seen in the pre-burn stand. This would produce a weak to moderate contrast in shrub dominated areas or treed areas. This contrast would be lower if the underlying surface is gravelly or rocky or in meadow areas.

In the characteristic landscape the line element would be seen in the ridges, drainage patterns, and boundaries between shrub and tree stands where the vertical height of the stand presents a linear edge with the adjacent shrubs. Prescribed fire would produce a linear edge between burned and unburned vegetation. Design features would reduce this edge effect by utilizing irregular burn patterns. Depending on treatment size, terrain location, and distance from the KOP, this would have a weak to moderate contrast.

Spot burning of shrubs or trees
This technique when coupled with design features would meet all VRM Classes in the project area. The treatment does not depend on topographic location or KOP location in order to meet VRM standards. Spot burning would produce the least visual impact of all techniques. Spot burning of shrubs or trees has the potential to result in short term contrasts of texture and color elements.

In the characteristic landscape, the texture element contrasts resulting from treating individual plants would not be noticeable due to the infrequency that they occur within the general area. The treatment is conducted in a spotty manner and in such a way that openings in the shrub or tree canopy are relatively small. Color contrasts are also infrequent and result in a spotty contrast within the general area. Regardless of location or distance, the casual observer would scan past or not recognized any element contrast.

Mowing shrubs
This technique when coupled with design features would meet all VRM Classes in the project area. Mowing shrubs has the potential to result in short term contrasts of form, color, and texture elements. The technique would not leave tracks due to low ground pressure, and the mowing

height can be adjusted to leave residual vegetation. This technique is confined to basins and gentle slope areas.

Locations where mowing can be utilized are similar to existing basin bottoms where vegetation can be dry/wet meadows with shrub perimeters or basins dominated with shrub vegetation. See Figure 14 showing mowing in proximity to natural dry meadows.

In the characteristic landscape for this treatment, form tends to be a flat to rolling surface with large stands of sagebrush or sagebrush-bitterbrush canopies covering the terrain. In certain areas this landscape would also have mosaic patterns resulting from intermixed communities of low sagebrush or dry or wet meadows. Mowing shrubs would create a contrast of form where the treatment area results in an open area having a lower surface height (shrubs canopy removed) compared with the surrounding vegetation. Where the landscape has intermixed low sage communities or meadows, these openings would mimic the characteristic landscape (see Figure 14). Depending on treatment size, terrain location, and distance from the KOP, this form contrast would be weak to moderate.

**Figure 14.** Photo of mosaic mowing treatment. Mowing treatments similar to those proposed in this document are in the foreground with natural dry meadows in the background at the toe of the slope. Photo from Slinkard Valley. Treatments implemented in cooperation between Bishop BLM and California Department of Fish and Game (now Fish and Wildife). Note that treatments proposed for the Bodie Hills involve a higher mower height to leave some residual shrub cover.

In the characteristic landscape color would be sage green to dark green from vegetation with a tan-grey soil component. Mowing would result in a mottled color of sage green (foliage), grey (shrub stem/branches), tan from exposed soil, and yellow-orange from splintered stems and branches. Where bitterbrush is a heavy part of the shrub mix, the treatment might have a high degree of yellow-orange for a short time until vegetation regrowth overtops the shredded material. This usually occurs within a month to a season. Mowing would have a weak to moderate contrast where the treatment is in a shrub dominated basin. There would be no contrast to a weak contrast in basins where shrubs are a smaller component of the vegetative community.

These basin areas have a vertical component, that being shrubs giving it an uneven or grainy canopy surface texture. Mowing would remove some texture element arising from the shrub canopy. The result would be a rough texture with a lower canopy height (reduced shrub height, matchstick pattern of stems and branches, chips, or slash covering the ground). This would be a low to moderate contrast where shrubs are the dominate vegetation. Where shrubs are less dominant, the contrast would be weak since this type of area tends to be flat smooth with shrubs providing a vertical component. Removing the shrubs would not noticeably change that view.

Hand cutting shrubs
This technique when coupled with design features would meet all VRM Classes in the project area and does not depend on topographic location or KOP location for meeting VRM standards. Hand cutting shrubs has the potential to result in short term contrasts of color and texture elements.

In the characteristic landscape color would be sage green to dark green from vegetation with a tan-grey soil component. Hand cutting shrubs and piling/burning slash or chipping in a mosaic pattern would result in tan colors from exposed soil and grey to black colors from the burnt piles. Chipping would produce a yellow-orange color from the chips. Because this is done in a mosaic pattern color contrasts are spread out over the general area and blend with undisturbed vegetation or islands. Color contrast would be weak to moderate.

In the characteristic landscape texture is grainy or uneven from the varying heights of shrub canopies and spacing between shrubs. After a hand cut treatment the area will have a rough to smooth flat texture, except where slash is piled and awaiting burning. This would produce a weak to moderate contrast although this contrast is spread over an area having undisturbed shrubs or islands.

Hand cutting pinyon/juniper
This technique when coupled with design features would meet all VRM Classes in the project area. Hand cutting pinyon and juniper has the potential to result in short term contrasts of color and texture elements. In general, this is the second least contrasting treatment method being considered, next to spot burning, and does not depend on topographic location or KOP location for meeting VRM standards.

In the general landscape, the potential element contrasts resulting from cutting individual trees would not be noticeable due to the low density of trees in the sites identified for treatment (see priorities for pinyon-juniper treatment in the Proposed Action) and the infrequency of the contrast. Where the treatment is on the edge of a pinyon-juniper stand where trees are expanding out into the shrubland, tree spacing is wide with no true canopy formation. The visual effects of each slash treatment, piling and burning and chipping are described below. See Figure 15.

**Figure 15**. Photo of piles after hand cutting pinyon juniper. Piles will cure for one year and then be burned so that the site is indistinguishable from the adjacent shrubland.

Piling and burning

This method of slash removal when coupled with design features would meet all VRM Classes in the project area. Piling and burning has the potential to result in short term contrasts of color and texture elements. Piling and burning can be part of hand cutting shrub and pinyon-juniper techniques. See Figure 15.

In the characteristic landscape color ranges from the sage and dark green of vegetation communities, to the grey and gray-black of rock outcrops and shadow areas, to the tan-grey of exposed soil. Piling and burning slash would result in tan colors from exposed soil and grey to black colors from the burning operation. Slash piling would have a color contrast as the needles dry out and turn brown or light brown and would begin turning within 6 months. After a year to two years the piles would be burned and the contrast would be eliminated. Surrounding shrub vegetation would screen burn pile areas from view. Because this would usually be done in a mosaic pattern color contrasts are spread out over the general area and blend with undisturbed vegetation or islands. Color and texture contrast would be weak to moderate.

Chipping

This method of slash removal when coupled with design features would meet all VRM Classes in the project area. Chipping would only be used where road access is available and terrain is generally flat to slight slopes allowing for chipper to be towed across treatment area. Chipping has the potential to result in short term contrasts of color.

Chipping would remove the need for slash piles and would eliminate any visual contrasts created by the piles. In the characteristic landscape color would be sage green to dark green from vegetation with a tan-grey soil component. Chipping would produce a yellow-orange color from the chips until they fade to the grey of the existing shrub stems within 6 months or are overtopped by vegetation regrowth. Where mosaic treatment patterns are employed, chipping

color contrasts would be minimal due to screening of the surrounding shrub vegetation. Color contrast would be weak to moderate.

Seeding native species
This technique would meet all VRM Classes in the project area. Seeding could be done by hand or with a rangeland drill which is designed with high ground clearance allowing it to travel over the ground with little disturbance.

Seeding would advance vegetation treatment area rehabilitation. As such, seeding would enhance the color element by the potential of new seedling establishment and the sage green and dark green colors of vegetation seedlings. Seeding would also accelerate the blending of any treatment area into the surrounding vegetation. This would produce a positive weak to moderate color texture contrast.

Landscape-wide program:
It is expected that all treatments (coupled with design features) will meet VRM Class standards. Where short term contrasts result, they will be weak to moderate and mitigated by design features. Any visual impacts resulting from contrasts to the visual elements will degrade after the first growing season upon completion of a vegetative treatment. This results from the natural regrowth of forbs, grasses and shrubs in the treatment areas. The treatment(s) would remove competition from shrub and tree components allowing enhanced vigor to existing vegetation and improving new seedling establishment. The resulting greening up or flush of vegetation would degrade any contrast to a “none” or “weak” level. In areas where slash piling of pinyon or juniper requires up to 2 seasons of drying out, the vegetative release or green up would take place after the second growing season. Vegetative regrowth and greening would blend the treatment area into the surrounding landscape. In the long term, the treatments throughout the project area can result in a natural looking treatment(s) with enhanced visual characteristics due to the diversity of forbs, grasses, and shrubs released or established as a result of the Proposed Action. As treatment areas mature over the ten year period, the visual resource should improve as the areas become more vegetatively diverse. This diversity should provide a more pleasing visual perspective of the characteristic landscape.
Most of the project area at higher elevations has excellent capacity for natural regrowth and seedling establishment due to higher precipitation and elevation. The lowest elevation areas might require 2 years for maximum vegetation response due to lower precipitation.

The prescribed fire treatment mimics the natural wildfires that are a part of the characteristic landscape of the project area but has the potential of having positive visual impacts different from the wildland fire regime. The difference is that wildfires are uncontrolled in location and intensity. The result can be long term negative visual impacts such as establishment of dominant cheatgrass stands or poor vegetation re-establishment due to intense fire heat. Implementation of this alternative should reduce the potential wildfire size, intensity and frequency in the project area as projected in the fire regime section (See Issue #5: Fire Regime). This should reduce the visual impacts that a large, catastrophic wildfire(s) might produce in the future. In the long term, prescribed fire can result in a natural looking treatment with enhanced visual characteristics due to the diversity of forbs, grasses, and shrubs released or established as a result of the prescribed fire.

Projects in riparian vegetation communities would meet VRM Class standards due to the small size of the treatment proposed for these areas. In aspen stands, the treatment result is not to remove standing desired tress but concentrate on ground level vegetation and invading conifers. The casual observer would scan past or not recognize any element contrast.

Special Status Areas:
32% of the proposed project area is in WSAs. Visual impacts would be similar to the above description for each treatment. Prescribed burning will be the favored treatment method without the use of control lines where possible. Drill seeding will not be used. See Issues 20 and 21 for the impact of these visual effects on the wilderness character.

Treatments conducted in the Conway Summit ACEC would have to be designed using small acreages and design features in order to comply with VRM Class I standards throughout the ACEC area.

The Bodie State Park bowl carries a VRM Class II standard. Use of prescribed fire would be limited within the bowl because of operational constraints and risk to the structures. The remaining treatments would meet visual standards when coupled with design features.

Fuel breaks adjacent to developed properties:
Where treatments are implemented next to residential or developed properties, the treatments will be designed to accomplish the purpose of ecological enhancement in conjunction with the creation of a fuel break to protect the developments themselves and the wildlands from fire. In these cases, the adjacent landowners would have a limited distance separation from the treatment to reduce any visual contrasts resulting from the mowing and cutting activities. Standing on the boundary, the property owner would view the treatment directly, and by scanning from side to side, the observer would have a wide lineal view of the whole treatment. Under these conditions the treatments with design features would meet VRM Class III standards.

*Cumulative Effects*

There is very little potential for cumulative effects on visual resources because there would be no long term visual impact as the project progresses through the ten year cycle due to the loss of element(s) contrast after the first (most treatments) or second growing season.

The only known or reasonably foreseeable changes in the characteristic landscape other than the Proposed Action are the development of the Bridgeport Gun Club along Masonic road, the closure and rehabilitation of the old shooting area east of the Mono County Maintenance Station, the closure and rehabilitation of the Green Creek material site, and additional development of the Conway Communication Site. All are within a VRM Class III area. It is not expected these projects combined with the Proposed Action would result in net positive or negative change in cumulative impacts. See the cumulative effects analysis for Issue one for a discussion of why other activities such as changes in grazing or mining are not expected to have cumulative effects in combination with this project.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

See analysis under the Proposed Action (Alt 2). There would no real change in the nature of visual impacts under this alternative. An additional 7,000 treatment acres would have visual impacts from various treatment methods. No mechanical or prescribed burning with the associated visual impacts would take place in the Bodie Bowl. Bodie Bowl would be grazed in order to affect vegetation within the bowl. Grazing would not produce contrasts in the four visual elements. The grazing treatment would meet VRM Class II standards.

Implementation of this alternative should further reduce the potential wildfire size, intensity and frequency in the project area as projected in the fire regime section (See Issue #5: Fire Regime). This should reduce the visual impacts that a large, catastrophic wildfire(s) might produce in the future.

*Cumulative Effects*

The cumulative effects of this alternative are expected to be the same as the Proposed Action except that the scale of the direct impacts is greater because of the increased acreage and the scale of the beneficial indirect effects due to the mitigation of severe wildfire is greater. See Cumulative Effects under the Proposed Action (Alt 2).

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

See analysis of the Proposed Action (Alternative 2). There would no real change in visual impacts under this alternative except that there would be less acres treated (6,600 treatment acre reduction) where no visual impacts would take place.

According to the analysis of Issue 5, this alternative would be less effective at mitigating the expected increases in wildfire severity, frequency, and size. This would result in greater negative visual impacts due to severe wildfire and the altered vegetation that would result than under the Proposed Action (Alternative 2).

*Cumulative Effects*

The cumulative effects are expected to be the same as those for the Proposed Action except that the scale of direct and indirect effects are smaller for this alternative due to the reduced acreage and the scale of beneficial indirect effects due to mitigation of severe wildfire is also expected to be smaller. See Cumulative Effects under the Proposed Action (Alt 2).

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

See analysis under the Proposed Action (Alt 2). There would no real change in visual impacts under this alternative except that there would be fewer acres treated (4,000 acre reduction) therefore fewer temporary visual impacts would take place due to treatments. No mechanical treatment methods would be used in WSAs.

According to the analysis of Issue 5, this alternative would be less effective at mitigating the expected increases in wildfire severity, frequency, and size in the WSAs. This would result in

greater negative visual impacts due to severe wildfire and the altered vegetation that would result than under the Proposed Action (Alternative 2). See Issue 21 for impacts to WSAs.

*Cumulative Effects*

See analysis under the Proposed Action (Alt 2). The cumulative effects of this alternative are expected to be the same as the Proposed Action except that the scale of the direct visual effects is slightly less due to the reduced acreage in the WSAs and the scale of the indirect beneficial impacts through mitigation of severe wildfire would also be less.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

See analysis under the Proposed Action (Alt 2). There would no real change in visual impacts under this alternative except that there would be less acres treated (5,600 acre reduction). There would be no direct visual impact to WSAs due to no treatment in WSAs, however there would be a potential indirect visual impact to WSAs and to the general project area because this alternative would be less effective than the Proposed Action at preventing the expected increase in wildfire size, frequency, and severity (See Issue #5). The vegetation changes that result from severe wildfire such as cheatgrass conversion could have a negative visual impact.

*Cumulative Effects*

See analysis under the Proposed Action (Alt 2). The cumulative effects are expected to be the same as the Proposed Action except that the scale of direct effects would be smaller due to the reduced acreage and the scale of the positive indirect effects would also be smaller because the alternative would be less effective at mitigating the expected increase in severe wildfires.

## Wilderness Values:

***20. Will the effects of the project on naturalness of the WSAs affect their eligibility for designation as wilderness?***

*Background*

Wilderness is defined in Section 2 (c) of the Wilderness Act of 1964. The characteristics of wilderness are included in the definition.

Size: A roadless area of contiguous public lands that "has at least 5,000 acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition."

Naturalness: An area that "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable."

Outstanding Opportunities: An area that "has outstanding opportunities for solitude or a primitive and unconfined type of recreation."

Supplemental Values: An area may contain "ecological, geological, or other features of scientific, educational, scenic, or historical value."

Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) directed the Bureau of Land Management (BLM) to classify and recommend suitable BLM lands for wilderness designation. It outlines a three phase process for wilderness review to be completed following the passage of the Act: inventory, study and reporting to Congress.

For California, the first phase was completed with the publication of the Final Intensive Inventory of Public Lands administered by BLM California outside the California Desert Conservation Area by the BLM in December 1979 (USDI BLM 1979). The characteristics of wilderness defined in the Wilderness Act were used to conduct the inventory. When wilderness characteristics were found within a defined boundary through the inventory process, the presence of wilderness characteristics was documented and the area was classified a Wilderness Study Area (WSA). FLPMA requires in Section 603(c) that, "*until Congress has determined otherwise, the Secretary shall continue to manage such lands according to his authority under this Act and other applicable law in a manner so as not to impair the suitability of such areas for preservation as wilderness…"* This language is referred to as the "non-impairment mandate". Congress may designate these WSAs as Wilderness or release them from study. Both of these actions require legislation.

For the lands presently managed by the BIFO, the second phase of wilderness review mandated by FLPMA was completed with the California Statewide Wilderness Study Report, 1990, Part 4, Volume One (WSR) (USDI BLM 1990a). The findings of the study determined whether the area was recommended as suitable or non-suitable for designation as wilderness at that time. It included the wilderness characteristics of each WSA (USDI BLM 1990a). The final phase of wilderness review was completed with reports to Congress in 1993.

Five areas in the Bodie Hills became WSAs after the 1979 inventory was completed (USDI BLM 1979). Three of these continue to be managed as WSAs and are located within the project area: CA-010-095, Mt. Biedeman WSA; CA-010-099, Bodie Mountain WSA; and CA-010-100, Bodie WSA. In the Omnibus Public Lands Management Act of 2009, Congress determined that two additional WSAs in the project area, the Mormon Meadow WSA (CA-010-094) and Masonic Mountain WSA (CA-010-102) would no longer be considered for wilderness designation and released them from the requirements of Section 603 of FLPMA.

The BLM's management policies for WSAs are described in BLM Manual 6330—Management of BLM Wilderness Study Areas. The BLM's management policy is "to continue resource uses on lands designated as WSAs in a manner that maintains the area's suitability for preservation as wilderness." The policy will "protect the wilderness characteristics of all WSAs in the same or better condition than they were on October 21, 1976… until Congress determines whether or not they should be designated as wilderness" (BLM Manual 6330 1.6.B). The BLM developed a non-impairment standard to meet the non-impairment mandate required by Section 603 (c) of FLPMA. Any project that takes place in a WSA must meet the non-impairment standard or one of its exceptions described in BLM Manual 6330 1.6.C.

The non-impairment standard generally states that uses and/or facilities in WSAs must be both "temporary" and not create "surface disturbance". Surface disturbance is defined as "new disruption of the rock, soil, or vegetation, including vegetative trampling, that would necessitate

reclamation, rehabilitation, or restoration in order for the site to appear and function as it did prior to the disturbance" (BLM Manual 6330 1.6.C).

The wilderness characteristics described in the WSR for the Mt Biedeman, Bodie Mountain and Bodie WSAs are summarized below. The WSR incorporates the wilderness characteristics described in the 1979 Final Intensive Inventory. Acres used in this project analysis are updated from the original inventory and report and based on information in the BLM GIS database, February 2013. The WSA boundaries have not been changed since 1979. Greater sage-grouse and its habitat were considered supplemental values of all three WSAs in 1990 (USDI BLM 1990a). It is now additionally a candidate for federal listing under the Endangered Species Act. Candidates for listing are considered supplemental values in BLM Manual 6330.

**Mt. Biedeman WSA, CA-010-095**

**Size**: 13,133 acres

**Naturalness**: The WSA's natural values had been maintained. The few man-made imprints in the area were generally unnoticeable. The WSA consists of volcanic hills, rocky knobs, broad meadows, and some ephemeral drainages. In 1976 most of the WSA was covered by big sagebrush, bitterbrush and perennial grasses. Plant density was high. Low sage was found on ridges, and as interspersed islands within the big sagebrush type. A stand of pinyon trees was located along the WSA's southern boundary. The unit also contained isolated aspen groves.

**Outstanding Opportunities**: There were outstanding opportunities for solitude throughout the WSA. The rugged hills, scenic quality and natural character of the unit provided area visitors with a sense of isolation and the opportunity to attain unconfined freedom of movement. The outside influence of vehicle use on State Highway 270 impaired solitude along the WSA's edge and periodic military overflights created temporary intrusions. Outstanding opportunities for primitive and unconfined types of recreation were available including hunting, backpacking, camping, nature appreciation, and scenic photography.

**Supplemental Values**: The WSA included a population of *Phacelia monoensis* and habitat for wildlife species including greater sage-grouse, mule deer and American pronghorn "that rely on this intact natural environment for their forage and cover" as well as crucial nesting habitat for sage-grouse and crucial deer fawning habitat.

**Bodie Mountain WSA, CA-010-099**

**Size**: 25,048 acres

**Naturalness**: Overall the unit's naturalness had been well maintained. The WSA consists of rocky volcanic hills with numerous canyons, volcanic mesas, and some meadows. Elevation ranges from 7,500 feet to 9,300 feet. Big Alkali Basin, believed to be a volcanic caldera, occupies the center of the WSA and appears as a soft-colored grassy meadow complex enclosed by a ring of small tree-covered hills. Numerous springs are located in the unit. Hot Springs and Clark Creek Canyons are especially scenic. The western half of the WSA contained a pinyon-

juniper woodland with big sagebrush in the bottomlands. In the northeastern corner there were numerous stands of quaking aspen. The WSA's eastern half is rolling mountainous terrain with the bottoms and side slopes that were covered with big sagebrush, bitterbrush, and perennial grasses. Low sagebrush was found on the ridge tops and as interspersed islands within the big sagebrush. The WSA contained a sphagnum peat bog which is unusual for this area.

**Outstanding Opportunities:** The unit's blend of physiographic variation, vegetative screening, and extensive size provided the visitor with an outstanding opportunity for solitude. Isolation could easily be found with most of the WSA. Cherry-stemmed roads impaired solitude along the southern portions of the unit and periodic military overflights created temporary intrusions. The primeval and diverse nature of the unit's natural character provided visitors with outstanding opportunities to participate in primitive and unconfined recreational activities, such as backpacking, cross-country skiing, nature appreciation, scenic photography, and horseback riding.

**Supplemental Values**: The WSA included a population of Mono County phacelia (*Phacelia monoensis)*, greater sage-grouse (*Centrocercus urophasianus*) habitat, mule deer (*Odocoileus hemionus*) and pronghorn (*Antilocapra americana*) forage and cover, and waterfowl habitat.

**Bodie WSA, CA-010-100**

**Size**: 16,623 acres

**Naturalness**: The unit had retained its overall primeval character and influence with the imprint of man's work substantially unnoticeable. The western two-thirds of the unit consists of rocky, steep volcanic hills reaching summits of 9,200 feet. This area has been incised by several perennial creeks which have exposed colorful and dramatic rock formations. Rough Creek drainage is especially scenic. Atastra Creek, Milk Ranch Canyon, and Halfway Camp also add striking scenic value to the unit. The eastern third of the WSA is dominated by the Beauty Peak/Dry Lakes plateau. Beauty Peak, a volcanic cinder cone, rises abruptly (9,018 feet) above the broad tabular Dry Lakes area and provides a different landform feature in the WSA. Most of the bottomlands and side slopes were covered by big sagebrush, bitterbrush, and perennial grasses. Plant density was high. Low sage was found on the ridges and as interspersed islands within the sagebrush, displaying a mottled appearance. There were dry and wet meadows in major drainages and around springs. The western slope of Rough Creek and the dry rocky ridges supported stands of pinyon-juniper. The deep drainages had numerous stands of aspen.

**Outstanding Opportunities:** The unit's varied terrain, extensive size, and vegetative diversity cumulatively provided outstanding opportunities for solitude. The deep canyons of Atastra Creek and Rough Creek provided opportunities to get away from it all. The rugged and primeval nature of Beauty Peak and the Dry Lakes Plateau heightened the visitor's feeling of isolation. Periodic military overflights created temporary intrusions to solitude. The area contained abundant opportunities for primitive and unconfined recreation. These included hunting, camping, historical sightseeing, geological sightseeing, wildlife study, backpacking cross-country skiing, horseback riding and rockhounding.

**Supplemental Values**: The WSA had wildlife diversity including greater sage-grouse, mule deer, and pronghorn habitat.

Changes since 1976:
The BLM has managed these WSAs since their designation to maintain the wilderness characteristics as described above. The size and outstanding opportunities for solitude and primitive and unconfined recreation remain unchanged from 1976. Naturalness based on landscape features and the lack of human developments has remained the same or in some cases improved because of the recovery of disturbances pre-dating WSA designation such as vehicle routes. However, the naturalness of the ecological systems including the vegetation and the wildlife that depend on it for their lifecycle needs have been changing. As documented in Issue 1 above, there are multiple ecological systems in the Bodie Hills that are highly departed from their natural range of variability and at risk of conversion to undesirable plant types such as invasive species. Cheatgrass has been increasing. Pinyon pine has increased from the few isolated stands mentioned in the Wilderness Study Report. In general pinyon has expanded outward from these stands into the sagebrush ecological systems noted in the report as the dominant features of the WSAs. For example, in the Bodie Mountain WSA where the western half was characterized by pinyon on the ridges and sagebrush in the bottomlands, pinyon has expanded into many of those bottom lands and filled in in density on the slopes and ridges. Similar changes have occurred in the Mount Biedeman and Bodie WSAs. This has resulted in a more fragmented habitat for wildlife and less flexibility for these species to adapt if catastrophic events such as fire remove suitable habitat. From an ecological perspective, the area has become less natural since establishment of the WSA's. In addition, increases in pinyon-juniper extent have adversely affected supplemental values associated with sagebrush dependent wildlife species including greater sage-grouse, mule deer, and pronghorn. Supplemental values associated wet meadows and aspen groves have also been adversely affected by increasing pinyon-juniper cover. As discussed in the introduction to this EA, these changes are probably the result of multiple interacting factors including fire suppression, climate change (both human caused and not), atmospheric enrichment by $CO_2$, and possibly past management before the designation of the WSAs.

The analysis of the projections for ecological departure and high risk vegetation classes in Issue 1 and the predictions for future wildland fire behavior at Issue 5 show that it is likely that these trends in ecological departure will continue and that the size and intensity of wildfires will increase causing vegetation conversions to non-native species.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Under the No Action Alternative, no treatments would be implemented so there would be no effects to wilderness characteristics from vegetation treatments. In the short term, the three WSAs in the Bodie Hills will continue to appear natural and would remain eligible for wilderness designation. The ecological departure, high risk vegetation classes, and risk of changing fire regimes would persist or be allowed to increase. Effects to each of the aspects of wilderness characteristics are discussed below:

**Naturalness:** The temporary impacts to the appearance of naturalness that would occur during treatments and in the initial period after treatments would not occur. The ecological condition of the area, however, would remain departed from the natural range of variability and will continue to be at high risk for conversion to undesirable vegetation types (such as non-native annual grasses) in the event of catastrophic events such as wildfire (see analysis for issues 1 and 5). The area would, in the short-term, retain the appearance of naturalness and continue to be eligible for designation. In the long-term the natural character of the area would be more vulnerable to decline and correspondingly the overall wilderness character could be negatively impacted.

**Outstanding opportunities:**
Solitude:
Under the no action alternative, opportunities for solitude may remain unchanged as there would be no programmatic vegetation work. There may be an indirect effect as a result of the increased risk of large, severe fires. Large, severe fires would result in less vegetative screening. In areas where the outstanding opportunity for solitude was enhanced by vegetative screening when the WSAs were designated, a large fire would have a negative effect on this characteristic.

Primitive and unconfined recreation:
Opportunities for primitive or unconfined recreation are not expected to change substantially as a result of the direct effects of no action. There may be indirect effects as a result of the potential for increased risk of large severe wildfires. If large severe wildfires were to occur, unconfined recreation may be less desirable in the WSAs. If wildlife populations were to decrease as a result of catastrophic wildfire, invasive species and/or pinyon encroachment, there could be a reduction in the opportunity to participate in wildlife viewing or hunting which were specifically identified as characteristics of each of the three WSAs.

**Supplemental Values**: Greater sage-grouse and/or greater sage-grouse habitat were identified as supplemental values of all three WSAs in the Bodie Hills in the 1990 study review (USDI BLM 1990a). Additionally, BLM policy specifically recognizes that candidate species (such as greater sage-grouse) are a special feature of WSAs. With no action to restore the landscape in the WSAs, greater sage-grouse habitat will continue to be at high risk of conversion and particularly susceptible to catastrophic wildfire events that would possibly lead to acceleration of habitat deterioration (see analysis for issue 12). Supplemental values for greater sage-grouse and other sagebrush dependent species would continue to be degraded and comprised.

In addition to greater sage-grouse, wildlife diversity, mule deer and deer fawning habitat, pronghorn and pronghorn habitat, and waterfowl and waterfowl habitat are all identified as supplemental values in WSAs. In the short-term, these values will continue to be adversely affected by current conditions and the trend toward a landscape dominated by late-seral and/or uncharacteristic vegetation classes (see Issue 1). These adverse effects are particularly acute where pinyon-juniper density and extent is compromising the quality and availability of montane sagebrush, low sagebrush, Wyoming big sagebrush, Basin big sagebrush, stable aspen, and riparian/wet meadow ecological systems. In addition, the late seral and uncharacteristic vegetation class dominated landscape may lead to increased intensity, frequency, and size of wildfire (see Issue 5). This could result in the direct loss of habitat and subsequent cheatgrass

invasion causing a decline in the diversity of habitat available for wildlife (see analysis for Issues 12-14).

Over the long-term, greater sage-grouse and American pronghorn are likely to be extirpated from the Bodie Mountain WSA if the current unmitigated trend towards uncharacteristic pinyon-juniper dominated sagebrush associated ecological systems continues. Substantial adverse effects to these species, and the associated supplemental wilderness values, are also likely to occur in the Mount Biedeman and Bodie WSAs. Overall, supplemental wilderness values related to wildlife and wildlife habitats identified in the original inventories and studies would continue to be degraded and comprised.

*Cumulative Effects*

There are no other past, present, or reasonably foreseeable projects or actions that are expected to have an effect on the wilderness characteristics and eligibility of the WSAs for designation as wilderness. The Cougar Gold Paramount mining exploration in the Bodie WSA in 2009 was authorized in 2009 under one of the exceptions to the non-impairment standard because it was a continuation of minerals uses occurring prior to the passage of FLPMA in 1976. The impacts from the exploration were temporary, so they will not have any cumulative effects in combination with the actions considered in this EA (Cougar Gold EA, BIFO files). BLM must follow the non-impairment guidelines in authorizing any future actions in the WSAs, so no effects to wilderness characteristics are expected. Projects that qualify under one of the non-impairment exceptions are also not reasonably foreseeable. This includes any potential for resuming mining or further mining exploration because no proposals have been submitted to the BLM.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

Under the Proposed Action, approximately 10% of the WSA acreage, or 5,392 acres of the 54,804 acres of WSA within the project area, would be treated. Actual acreages would depend on site selection but are estimated based on the distribution of identified vegetation types. Approximately 1,645 acres of the project area would be treated with prescribed fire. This represents 31% of the acres treated within WSAs. The remaining 3,747 acres of the WSA treatment acreage estimate would potentially receive mechanical treatment. Methods utilized for restoration could include mowing, hand cutting pinyon/ juniper, hand cutting shrubs, chipping, piling and burning and seeding.

The project qualifies under one of the exceptions to the non-impairment standard described in BLM Manual 6330:

> *f. Protect or enhance wilderness characteristics or values. As described in section 1.6.A.2 of this manual, Section 2(c) of the Wilderness Act of 1964 outlines the characteristics of every wilderness. Actions that clearly benefit a WSA by protecting or enhancing these characteristics are allowable even if they are impairing, though they must still be carried out in the manner that is least disturbing to the site*. (BLM Manual 6330 1.6.C.2.f)

The purpose and need of the project is to enhance the ecological values which contribute to the naturalness and supplemental values that make up the wilderness characteristics for which each of the three WSAs were designated in 1979. These ecological conditions have been declining since the benchmark of conditions in 1976 when FLPMA was passed. The treatments will limit ecological departure, reduce the risk of conversion to non-native cheatgrass, limit the risks of uncharacteristic wildfire, and benefit the wildlife species that are supplemental values of the WSAs including greater sage-grouse, pronghorn and mule deer (See analysis at Issues 1, 5, 8, and 12).

BLM Manual 6330 contains additional guidance related to the non-impairment standard and use of the exceptions specific to fire, prescribed fires, fuel treatment, pre-fire treatment, vegetation management and wildlife that support use of treatments for the purpose of ecological restoration.

BLM policy for managing fire in WSAs is "to allow the frequency and intensity of the natural fire regime to play its inherent role in the ecosystem" (BLM Manual 6330 1.6.D.2.a.i).

> "*The overall goal may be affected by past human actions. These may include fire suppression leading to fuel buildup creating the possibility of unnaturally severe fires, or the invasion of non-native annual grasses leading the unnatural spread of fire in ecosystems that evolved without broad-scale fire*" (1.6.D.2.a.ii). Where this is the case BLM policy allows for the use of prescribed fire or mechanical treatments.
> "*The BLM may utilize prescribed fire in WSAs where the natural role of fire cannot be returned solely by reliance on wildfire or where relying on wildfires might create unacceptable risks to life, property, or natural resources outside the WSA*" (1.6.D.2.c.i.).
> "*Fuel treatments may be permitted under the restoration or public safety exceptions to the non-impairment standard when: ... B. natural successional processes have been disrupted by past human activity to the extent that intervention is necessary in order to return the ecosystem to a condition where natural process can function; or C. non-native species have altered the fire regime so that wildland fires pose an undue risk to the native ecosystem*" (1.6.D.d.ii).

The BLM WSA Manual also specifically allows for vegetation restoration projects for similar purposes including the recovery of federally listed threatened, endangered or candidate species (such as the greater sage-grouse) (BLM Manual 6330 1.6.D.8.a).

> *"Where it meets the non-impairment standard or one of the exceptions, management action may be taken to restore vegetation to characteristic conditions of the ecological zone in which the area is situated where:*

*I.* *Natural successional processes have been disrupted by past human activity, to the extent that intervention is necessary in order to return the ecosystem to a condition where natural processes can function;*

*II.* *Restoration through natural processes would require lengthy periods of time during which the impacted area would receive unwanted human use or be susceptible to significant soil loss without intervention, or further ecological departure would occur, or,*

*III.* *It is necessary to maintain fire-dependent ecosystems when adjacent land uses do not allow for natural fire occurrence*

(BLM Manual 6330 1.6.D.8.b.iii.B).

There are various requirements in order to undertake a vegetation restoration program within a WSA and all of them are met by the Proposed Action. They include using "the least disruptive techniques that have the best likelihood for success", a monitoring program, and basis in a landscape assessment (1.6.D.8.b.iii.D,E,F).

> *Restoration projects are based on landscape assessments that identify historical range of variability, current condition, restoration targets, and cumulative effects of management. The decision to manipulate an ecosystem must be based upon clearly articulated, well-supported management objectives and available scientific information. At a minimum, the EA or EIS for any proposed manipulation of vegetation must address the following:*
>
> - *A description based on historical and scientific evidence of the natural vegetative community and processes that would have existed prior to the effects of industrialized humans.*
> - *A description of the existing condition and how it is a departure from the natural vegetative community and processes.*
> - *Evidence from existing research/application that the proposed treatment will bring about the desired result.*
> - *An evaluation of the likelihood of the natural system to be self-sustaining after the treatment. Treatments should allow for natural processes to resume. Where this is not possible because of conditions outside the WSA (e.g. a fire regime influenced by adjacent private land development), the contributing conditions and factors must be described.*

(BLM Manual 6330 1.6.D.8.b.iii.F)

The Proposed Action is based on the TNC landscape assessment and further analysis is provided throughout this EA in particular, Issues 1, 5, and 8 (Ecological Departure, Fire Regime, and Cheatgrass and other non-native plants) analyze the historical/natural range of variability, current condition and potential future conditions under all the alternatives, cumulative effects of management, and the potential for the natural system to be self-sustaining after treatment with a fire regime that maintains native plant communities. This EA is done at a programmatic landscape scale in order to understand the effects on the entire landscape and the need for treatment inside and outside WSAs. The conclusion of these analyses is summarized below.

**Rationale for consistency with BLM WSA Management Policy**: The analysis of Issue 1 documents the current and projected future ecological departure in the Bodie Hills and how the Proposed Action would help maintain or restore ecological conditions. By maintaining or moving the system towards less ecological departure, the landscape will be in a condition where the natural processes can function thereby making it more likely to be self-sustaining after the treatments. The ecological departure of the majority of the ecological systems in the Bodie Hills has led to fuel buildup that creates the likelihood of unnaturally severe fires. As discussed in the analysis for Issue 5, in the Bodie Hills the size and severity of predicted fires are expected to be well outside the natural range and conversion to cheatgrass after fire is expected to make this even worse (see Issues #5 and 8). The Proposed Action would be expected to moderate the fire regimes in the Project Area so that fire size and severity were closer to the natural range. There may still be increases in fire frequency, size and severity as predicted for the No Action

Alternative, but the treatments would be expected to moderate this increase and keep fire characteristics closer to the Natural Range of Variability.

The analysis of Issue 8 shows that non-native cheatgrass is increasing in the ecological systems of the Bodie Hills and is predicted to further increase if severe wildfire outside the natural range of variability occurs as predicted under the No Action Alternative. While the treatments may create some localized high risk areas for cheatgrass, on a landscape scale they would help prevent some of this conversion of ecological systems to non-native vegetation. The overall effect is expected to be beneficial in the Bodie Hills landscape, including the WSAs.

The analysis of all the natural resources that contribute to the naturalness and supplemental values of the WSAs show that they will be improved compared to the No Action Alternative. This includes vegetation conditions (Issues 1, 5, 7 and 8) and wildlife (Issues 12 and 13).

The Proposed Action contains clear and measurable objectives for restoration treatments and a method for determining which treatment type to use in specific sites to achieve those objectives (see Proposed Action especially the tables for each ecological system, the method selection criteria and the design features). The current scientific research supporting the landscape analysis and the evidence that treatments will have the desired effect is extensively cited in the TNC analysis and in the analyses in this EA. The BLM has successfully used these treatment methods for many years in the local area as well as across the Great Basin in related ecosystems, so the likelihood of success is high.

The Proposed Action is designed to use the least disturbing, lowest impact techniques possible to achieve the desired results (see method selection criteria in the Proposed Action). There are additional method selection criteria and design features for WSAs to ensure that the least disturbing method is used and the Wilderness characteristics and values are protected. Prescribed burning is the preferred method in WSAs where it can accomplish the desired ecological state. Although fire is generally considered the restoration method with the least impact on wilderness characteristics, wildfire and prescribed fire cannot be used in areas where risk of non-native annual grass increase is high without potentially harming the area's wilderness characteristics and potentially the natural and cultural resources of adjacent areas. Further invasion of non-native species would harm the natural character of the area and alter the fire regime. It would also put the greater sage-grouse and their habitat, both supplemental values of the WSAs, at risk through the loss of sagebrush ecological systems on which they depend and indirectly by increasing the risk of uncharacteristically severe wildfires that would cause further habitat loss.

Where pinyon and juniper have expanded into sagebrush habitats that are important for sage-grouse, prescribed burning cannot always be used without negatively impacting the sage-grouse and therefore the wilderness characteristics for which the WSAs were designated. Other methods such as hand cutting and pile burning or chipping can remove the pinyon and juniper while still maintaining the understory of sagebrush and bitterbrush that is used by the sage-grouse for nesting, shelter and forage.

Some of the boundaries of the WSAs are in close proximity to communities and the use of prescribed or wildfire inside the WSA may pose a risk to those developments outside. Examples

include the western edge of the Bodie Mountain WSA that is in close proximity to the community of Bridgeport and the southern edge of the Bodie WSA that is in close proximity to Bodie State Historic Park which contains many historic wooden structures that are vulnerable to loss by fire.

In these cases where fire would have negative impacts, the Proposed Action would use mechanical treatment methods that are least disturbing to the site. The treatment most likely to achieve the desired vegetation state and cause the least disturbance to other resources or risk of adverse outcomes (i.e. cheatgrass) will be used. Mechanical treatments that may be used in the Proposed Action are mowing, hand cutting shrubs, hand cutting pinyon/juniper, piling and burning, and chipping. Method selection criteria are described in detail in the Proposed Action. Method selection criteria and design features for the Proposed Action are designed to ensure the project activities maintain or enhance wilderness characteristics within the WSAs. Although the purpose of the project falls under one of the exceptions to the non-impairment standard, as much as possible, the treatments will be implemented to be consistent with the non-impairment guidelines as described on page 10 of BLM Manual 6330. Any negative impacts to wilderness characteristics will be temporary and there are design features for the project in WSAs specific to use of vehicles and roads, prescribed fire, fire lines, cutting, MIST techniques and seeding to avoid or limit creating new surface disturbance (see WSA design features).

The effects of treatment methods on wilderness characteristics are discussed for each characteristic below:

**Naturalness:** The Proposed Action would have a positive effect on the wilderness characteristic of naturalness. It would restore broad-scale landscape function by improve the resiliency of the most ecologically departed and at risk ecological systems of the Bodie Hills by preventing or limiting future increases in ecological departure from the natural range of variability and of high risk vegetation classes (see analysis for issues 1,5, and 8). It will make the ecological systems more resistant to conversion to non-native species, increase the potential for a natural disturbance regime to be reintroduced, benefit wildlife such as greater sage-grouse, and reduce the risk of damage to the Bodie Hills ecosystems by large scale fires outside the natural fire regime.

The benchmark condition for non-impairment of wilderness characteristics in WSAs is the condition of the area in 1976 or the current condition of the WSAs, whichever is better (1.6.B.6). Restoration of the natural variability in the ecological systems of the three WSAs is consistent with protecting and enhancing the characteristic of naturalness in the WSAs because it will restore the area to a condition closer to the reference condition of 1976. See the discussion of changes in vegetation composition in the WSAs since 1976 in the background section above.

Some aspects of the Proposed Action would temporarily affect the appearance of naturalness, but in a way that would be substantially unnoticeable after one growing season, as required by design features for WSAs (See also Issue 19, visual effects). When pinyon and juniper are cut in WSAs there will be stumps left behind that may have a negative effect on the appearance of naturalness. The trees that will be cut will be younger, smaller trees; the smaller stumps may be less noticeable. In WSAs trees will be cut to less than 4” to minimize the visual impacts of the

results. Cut trees will be piled and burned on stumps where possible in order to consume the stumps.

Fire lines used during burning can appear artificial; however the use of fire lines will be avoided when possible by burning during conditions where the fire will not spread (see Figure 12 and Figure 13 in the analysis of Issue 19). In other parts of the project area linear fuel breaks will be installed along roads to limit the potential for wildfires in Wyoming sagebrush ecological systems that are at the highest risk of cheatgrass conversion, however linear fuel breaks will not be used in WSAs. All the treatment units in WSAs will be designed to have a natural appearance with uneven boundaries that follow natural features or contours where possible and with irregular islands of untreated vegetation. Even where mechanical methods are used these units will appear natural to most people after a couple years (see Issue 19, visual effects).

Mowing is identified as the least desirable method in for vegetation removal in WSAs. It will have a temporary negative effect on the appearance of naturalness. This effect will be less conspicuous over time and should not impact the wilderness characteristics of the area.

See the analysis for visual quality (Issue 19) for the Proposed Action for a detailed discussion of how each treatment method may affect visual elements of the landscape. By applying the design features for visual resources and WSAs, it will be possible to meet project objectives without substantially noticeable effects to the appearance of naturalness.

**Outstanding opportunities:**
Solitude:
All effects of the Proposed Action to solitude would be temporary. The presence of personnel and equipment during implementation of vegetation treatments would affect solitude. The noise created by mowers, chippers, chainsaws, etc. would affect a wide area (potentially up to ½ mile for chainsaws, depending on terrain and wind conditions) for a short time (up to 2 weeks per treatment). Visitor use in the WSAs is low therefore the probability of a recreation user encountering one of the treatments while it is being implemented is low (USDI BLM 2012d).

The treatment units are small and dispersed so they will not substantially reduce screening in areas where vegetative screening from pinyon and juniper was a contributing factor to the wilderness characteristic of opportunities for solitude in 1976. The smaller units will contribute to the short term nature of each event. Pinyon and juniper removal treatments will focus on the removal of younger trees, some of which have established since the designation of the WSAs.

Primitive and unconfined recreation:
The Proposed Action may help maintain or improve opportunities for hunting and wildlife viewing by improving wildlife habitat, which may result in stable or increasing wildlife populations (see Issue 12). Otherwise, opportunities for primitive and unconfined recreation are not expected to change as a result of the Proposed Action. The action is consistent with the exception to protect or enhance wilderness characteristics because it will reduce the likelihood of severe wildfires and help preserve the experiences identified as wilderness characteristics in all three WSAs. Potential temporary effects to the quality of recreation experience are addressed under naturalness and opportunities for solitude.

**Supplemental Values:** The threats to the supplemental values of wildlife diversity, greater sage-grouse, pronghorn, mule deer, waterfowl and their habitats that would continue and worsen under the No Action Alternative will be mitigated by the treatments in the Proposed Action. The acres of under-represented seral classes created by the Proposed Action within the WSAs will be critical to these wildlife values (See Issues 1, 12 and 13).

**Summary:** The Proposed Action is designed to improve condition and trend of vegetation, natural biological diversity, and naturalness in terms of ecosystem integrity. It will also help prevent the degradation and potential extirpation of the supplemental wildlife values of the WSAs. As a result it may also benefit primitive and unconfined recreation activities such as hunting and wildlife viewing. It may help protect visual and cultural resources by reducing the incidence of high-intensity wildfires. Treatment methods will affect visual resources and the appearance of naturalness; these effects will be substantially unnoticeable after one growing season. It will also have temporary effects on the experience of solitude. It is expected to have little or no effect on other resources and wilderness qualities. Overall, this Alternative is expected to improve the wilderness quality of the WSAs.

*Cumulative Effects*

There are no other past, present, or reasonably foreseeable projects or actions that are expected to have an effect on the wilderness characteristics and eligibility of the WSAs for designation as wilderness therefore there are no cumulative effects. See the cumulative effects discussion for the No Action Alternative.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Under the increased acreage alternative, approximately 14% of the WSA acreage, or 7,403 acres of the 53,215 acres of WSA within the project area, would be treated. Actual acreage would depend on site selection but are estimated based on the distribution of identified vegetation types and conditions. Approximately 1,645 acres of the project area would be treated with prescribed fire. This represents 22% of the acres treated within WSA's. The remaining 5,758acres of the WSA treatment acreage estimate would potentially receive treatment by the other methods as described in the Proposed Action. There would be grazing around Bodie State Park instead of the menu of treatment methods described in the Proposed Action.

**Naturalness**: The effects would be similar to those described in the Proposed Action, however because a larger area would potentially be treated mechanically there could be greater temporary impacts to the natural character of Wilderness. There would correspondingly be greater long-term improvements to the natural character of Wilderness, as described in the analysis of Issue 1. There would be a greater reduction in the risk of fires outside the range of natural variability (See the analysis of Issue 5). The use of grazing instead of other treatment methods around Bodie State Park may appear more natural to some people than burning or mechanical methods.

**Outstanding opportunities:**
Solitude:
Under the increased acreage alternative, the effects to the opportunity for solitude in the WSAs would essentially be the same as in the Proposed Action. The increase in acreage would result in a slight increase in the short-term impact to solitude resulting from the presence of personnel and equipment in treatment areas. There may be a slight decrease in the impact to solitude near Bodie State Park, compared with alternative 2, if fewer people are necessary to implement grazing treatments and the noise associated with use of the other methods is not necessary.

Primitive and unconfined recreation:
The effects on the opportunities for primitive or unconfined recreation are expected to be very similar to the Proposed Action. Because more acres would be treated, there could be an enhanced increase over time in the opportunity to view wildlife or hunt in areas that were treated (as described in the Proposed Action).

**Supplemental Values:**
The Increased Acreage Alternative would have a better chance of mitigating the threats to the supplemental values of wildlife diversity, greater sage-grouse, pronghorn, mule deer, waterfowl and their habitats than the Proposed Action because of greater treatment acres in several key ecological systems (see Issues 1, 12 and 13).

*Cumulative Effects*
There are no past, present or reasonably foreseeable actions in the WSAs that would affect wilderness characteristics and eligibility for designation as wilderness therefore there are no expected cumulative effects. See the cumulative effects analysis for the No Action Alternative above.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*
*Direct and Indirect Effects*
Under the reduced acreage alternative, the project area would be smaller and the number of acres of WSA in the project area would also be reduced. Approximately 29% of the WSA acreage, or 2,935 acres of the 29,356 acres of WSA within the project area, would be treated. Actual acreage would depend on site selection but the number is estimated based on the distribution of identified vegetation types and conditions. Approximately 907 acres of the project area would be treated with prescribed fire. This represents 31% of the acres treated within WSA's. The remaining 2,028 acres of the WSA treatment acreage estimate would potentially receive treatment by the methods described in the Proposed Action.

Because the number of acres treated in the Bodie and Bodie Mountain WSAs would be smaller, there would be a reduced temporary impact to the natural character of the WSA's in the project area compared with the Proposed Action. There would also, correspondingly, be a reduced long-term improvement to the natural character of the area because fewer acres would be treated. The candidate species greater sage-grouse and its' habitat would be more vulnerable to catastrophic wildfire habitat conversion then in the Proposed Action. The area would, in the short-term, retain the appearance of naturalness and continue to be eligible for designation. In the long-term the natural character of the area would be more vulnerable to decline and correspondingly the overall

wilderness character could be negatively impacted. The effect to the Mount Biedeman WSA would be unchanged from the Proposed Action as it lies entirely within the WUI.

**Outstanding opportunities:**
Solitude:
Under the treatment in CWPP WUI Alternative the effects to solitude in the Bodie and Bodie Mountains WSAs would be less than in the Proposed Action and more than in the No Action because the acreage being treated would be reduced. The short term effect on solitude caused by crews and equipment in the area can be correlated with acreage treated. The impacts on solitude in the Mount Biedeman WSA are the same as in the Proposed Action.

Primitive and unconfined recreation:
The effects on the opportunities for primitive or unconfined recreation are expected to be very similar to the Proposed Action. Because fewer acres would be treated, there could be a slightly reduced opportunity to view wildlife or hunt in areas that were treated (as described in the Proposed Action) over the long-term. The impacts to solitude in the Mount Biedeman WSA are expected to be the same as the Proposed Action.

**Supplemental Values:**
The CWPP WUI Alternative would be less effective at mitigating the threats to the supplemental values of wildlife diversity, greater sage-grouse, pronghorn, mule deer, waterfowl and their habitats than the Proposed Action because of fewer treatment acres especially in the Bodie WSA (see Issues 1, 12 and 13).

*Cumulative Effects*
There are no past, present or reasonably foreseeable actions in the WSAs that would affect wilderness characteristics and eligibility for designation as wilderness therefore there are no expected cumulative effects. See the cumulative effects analysis for the No Action Alternative above.

*Alternative 5: Limited Treatment in WSAs*
*Direct and Indirect Effects*
Under the Limited Treatment in WSAs Alternative, the project area would be smaller because fewer acres of WSA would be able to be treated. Broadcast burning cannot simply be substituted for mechanical treatment. In some ecosystem types and on areas with particular site characteristics, use of broadcast burning is not an appropriate way to restore ecosystem health because it will not achieve the desired landscape restoration goals. Approximately 3% of the WSA acreage, or 1,645 acres of the 53,215 acres of WSA within the project area, would be treated. Actual acreage would depend on site selection but the number is estimated based on the distribution of identified vegetation types and conditions. Approximately 1,645 acres of the WSA project area would be treated with prescribed fire. Overall, an estimated 13% of the acres treated would be within WSA's.

**Naturalness:** Because no acres would be treated using mechanical methods such as mowing and tree cutting, the unnatural appearance that would temporarily be created by utilization of those treatment methods would not occur. The effect of fire on naturalness is described in the Proposed

Action. The amount of land that would be restored to a more natural range of variability in the long-term would be reduced. Because the number of acres treated would be smaller, the area would remain at higher risk of conversion to undesirable species and there would be an increased risk of severe wildfires in the WSAs.

**Outstanding opportunities**:
Solitude:
If the Broadcast Burning Only alternative is implemented the effects to solitude would be less than in the Proposed Action because fewer acres could be treated in WSAs and crews and equipment would not be able to work in as many places. Some mechanical equipment would not be utilized and the associated noise would be reduced.

Primitive and unconfined recreation:
The effects on the opportunities for primitive or unconfined recreation are expected to be very similar to the Proposed Action. Because fewer acres could be treated if burning only was used, the positive habitat gains would not be realized over as many acres and more areas would remain high risk for conversion to undesirable species, there could be a slightly reduced opportunity to view wildlife or hunt in the project area (as described in the Proposed Action) over the long-term.

**Supplemental Values:**
The Limited Treatment in WSAs Alternative would be less effective at mitigating the threats to the supplemental values of wildlife diversity, greater sage-grouse, pronghorn, mule deer, waterfowl and their habitats than the Proposed Action because of fewer treatment acres and the lack of tools to improve wildlife habitat without increasing the risk of invasion by non-native cheatgrass (see Issues 1, 8, 12 and 13).

*Cumulative Effects*
There are no past, present or reasonably foreseeable actions in the WSAs that would affect wilderness characteristics and eligibility for designation as wilderness therefore there are no expected cumulative effects. See the cumulative effects analysis for the No Action Alternative above.

*Alternative 6: No treatment in WSAs*
*Direct and Indirect Effects*
**Naturalness**: If there are no treatments in WSAs, there would be no temporary negative impact on the natural character or special features of the WSAs. Land within the WSAs would, however, receive no restoration and be more vulnerable to long-term negative impacts (see issue 1 analysis). The impacts to the wilderness characteristics in WSAs are similar to the no-action alternative. Treatments on lands adjacent to the WSAs may indirectly affect the naturalness of the WSAs by reducing the risk of severe wildfire in the area and reducing the opportunity for conversion to undesirable species on adjacent lands.

**Outstanding opportunities**:
Solitude:
The effects of no treatment in WSAs are essentially the same as the no action alternative. There could still be very minor effects on solitude if there is treatment in areas within sight or hearing of the three WSAs.

Primitive and unconfined recreation:
The long term benefits to wildlife habitat for wildlife viewing and hunting, as described in the analysis of the Proposed Action, would not be realized in WSAs if there was no treatment in those areas.

**Supplemental Values:**
The effects to supplemental values in the WSAs under the No Treatment in WSAs Alternative would be similar to the No Action Alternative. The local threats to the supplemental values of wildlife diversity, greater sage-grouse, pronghorn, mule deer, waterfowl and their habitats would continue with the potential for degradation or even extirpation of some of these values from within the WSAs (see the analysis of the No Action Alternative and Issues 1, 12 and 13).

*Cumulative Effects*
There are no past, present or reasonably foreseeable actions in the WSAs that would affect wilderness characteristics and eligibility for designation as wilderness therefore there are no expected cumulative effects. See the cumulative effects analysis for the No Action Alternative above.

***21. What will the effects of the project be on wilderness characteristics outside of WSAs?***

*Background*
Under Section 201 of FLPMA, the BLM is responsible for maintaining on a continuous basis an inventory of all public lands and their resources and other values, including wilderness characteristics. The inventory result is a finding of presence or absence of wilderness characteristics as defined by Congress in the Wilderness Act of 1964. The Final Intensive Wilderness Inventory of BLM land in California outside the California Desert Conservation Area, was completed in 1979 and resulted in the establishment of WSAs (See the background for issue 20). The BLM remains responsible for maintaining an inventory of lands with wilderness characteristics that are not presently included in WSAs or designated wilderness areas. Inventories of lands with wilderness characteristics are not a land management designation. Circumstances that may trigger an update include NEPA analysis (such as this EA) for a project that could affect wilderness characteristics (BLM Manual 6310 .06.A.) (USDI BLM 2012c).

Wilderness inventory updates are completed in an internal, interdisciplinary process using a protocol essentially identical to that used in 1979 to determine whether wilderness characteristics are present. The protocol is described in BLM Manual 6310—Conducting Wilderness Characteristics Inventory on BLM Lands (USDI BLM 2012b). Wilderness characteristics are defined in Section 2(c) of the Wilderness Act and are described in the background of Issue #20.

As a part of the analysis for this EA, in 2011 an interdisciplinary team of BLM specialists conducted a wilderness inventory update of all public lands in the Bodie Hills project area that are not presently within WSAs. Unit names and boundaries from 1979 are generally retained, except where revised to reflect changes in land ownership or updated inventory findings. Complete inventory results are on file at the BLM Bishop Field Office. Five inventory units totaling 40,141 acres were found to have wilderness characteristics (USDI BLM 1976-2012).

Two units, Mormon Meadows East (CA-010-1094-1) and Masonic Mountain (CA-010-1102) are former WSAs, released by Congress from wilderness review in 2009. These were managed under the non-impairment mandate of H-8550-1, Interim Management Policy for Lands under Wilderness Review (superseded by BLM Manual 6330) from 1979 to 2009. There have been no impacts to wilderness characteristics in those units since the WSAs were released in 2009 (USDI BLM 1976-2012).

Two units in the southeastern Bodie Hills have undergone a change in conditions since the completion of the 1979 inventory. The part of the Excelsior unit (CA-010-1088) north of Highway 168 formerly had less than 5000 acres of public land; the BLM has since acquired private land at Cedar Hill within the unit boundaries and it now, at 6939 acres, is large enough to have wilderness characteristics. In the very large 1979 Sugarloaf unit some of the impacts to naturalness noted in 1979 were no longer apparent. These impacts were vehicle routes that were very apparent in 1979 but have now revegetated and are not easily noticeable. Two parts of this area were found to have wilderness characteristics, and are now designated Sugarloaf South (CA-010-1096-2) and Sugarloaf West (CA-010-1096-3) (USDI BLM 1976-2012).

The remaining inventory units were found to lack wilderness characteristics, for essentially the same reasons identified in 1979. These reasons include not meeting the roadless acreage criterion or any of the exceptions (11 units); not meeting the naturalness criterion (one unit); and lacking outstanding opportunities for solitude or primitive recreation (one unit). The area that lacks naturalness has numerous maintained roads and an extensive network of unmaintained vehicle routes, structures, mining areas, excavations, slag piles, reservoirs, a radio relay station, and large transmission lines. The area that lacks solitude is narrow, lacks topographic screening due to flat topography and largely lacks vegetative screening. Both Highway 167 and recently constructed residences on nearby private land are also in plain view of nearly all parts of the unit (USDI BLM 1976-2012).

Effects to the inventoried wilderness characteristics of size, naturalness, outstanding opportunities for solitude or a primitive and unconfined type of recreation, and supplemental values as defined in the 1964 Wilderness Act, interpreted by BLM's Policy on Conducting Wilderness Characteristics Inventory (BLM Manual 6310), and identified in the 2011 inventory update are considered here. Inventoried wilderness characteristics outside of WSAs are not managed under the guidance of BLM Manual 6330 or a similar policy, but the BLM is required to analyze and consider potential effects on them (BLM Manual 6320 .06).

The size characteristic is not changed by any of the alternatives, so it will not be individually discussed for each of the alternatives below. The following analysis applies to all alternatives:

**Size:** None of the alternatives includes any construction, improvement, or maintenance of roads. The size of the parcels of land with wilderness characteristics will not be affected by any of the alternatives.

For the characteristic of supplemental values, the 2011 inventory update identified scenic values, historic features, and habitat for wildlife including mule deer, sage-grouse and other sagebrush obligate birds. The analysis of effects on each of these values is included in other parts of this EA. Visual resources are analyzed in Issue 19. Discussions on the effects of each alternative on habitat for wildlife including sage-grouse and mule deer are included in the analysis for Issues 12-14. Historic Resources are discussed in the Historic and Cultural Resources analysis later in this chapter. Conclusions of these analyses relevant to wilderness characteristics are summarized for each alternative below.

With the exception of the No Action alternative, the estimates for the number of acres treated is an approximation based on the assumption that the treatments will be distributed with relative uniformity between lands with wilderness characteristics and the rest of the project area. This estimation is used to help show the difference between alternatives.

*Alternative 1: No Action*

*Direct and Indirect Effects:*

Under this alternative, no treatments would be implemented on lands with wilderness characteristics.

**Naturalness**: With no treatment, inventoried land with wilderness characteristics would have the same natural appearance. An increased risk of severe wildfire as a result of ecological departure throughout the area would continue to be a concern as would the high risk of conversion to non-native species. The ecological departure concerns in the Bodie Hills are discussed in Issues 1 and 5. The altered natural characteristic of the Bodie Hills, from a wilderness perspective, is discussed in Issue 20.

**Outstanding Opportunities:**

Solitude:

Under the no action alternative, opportunities for solitude may remain unchanged as there would be no programmatic vegetation work. There may be an indirect effect as a result of the increased risk of large, severe fires. Large, severe fires would result in less vegetative screening. In areas where the outstanding opportunity for solitude is enhanced by vegetative screening, a large fire would have a negative effect on this characteristic.

Primitive and unconfined recreation:

Opportunities for primitive or unconfined recreation are not expected to change substantially as a result of the direct effects of no action. There may be indirect effects as a result of the potential for increased risk of large severe wildfires. If large severe wildfires were to occur, unconfined recreation may be less desirable on lands with wilderness characteristics. If wildlife populations were to decrease as a result of a severe wildfire, invasive species and/or pinyon encroachment, there could be a reduction in the opportunity to participate in wildlife viewing or hunting.

**Supplemental Values:** Analyses of effects to wildlife, visual, and cultural resources found that while there would be no direct effects to these values from treatments, indirect effects could result due to the continued ecological departure of the ecological systems of the Bodie Hills and increasing risk of uncharacteristic wildfire. Populations of greater sage-grouse, pygmy rabbit and mule deer may decline. Visual and cultural resources may be negatively impacted by severe wildfire.

*Cumulative Effects:*

A review of all past, present, and reasonably foreseeable activities in the Bodie Hills found none that would have cumulative effects on the units found to have wilderness characteristics in 2011. The 2011 inventory demonstrates that there have been no lasting impacts to wilderness characteristics in the past in these areas and impacts from some past activities have actually recovered. No current projects are planned that have the potential to affect these characteristics. There are also no reasonably foreseeable projects where a decision has been made that would impact these characteristics. Activities on private land inholdings could affect wilderness characteristics, but BLM does not know of any development that is planned.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

If this alternative is implemented approximately 4,062 acres of lands with wilderness characteristics would receive vegetation treatments.

**Naturalness:** The Proposed Action does not involve construction or installation of any human-made structures or features. It is not expected to result in the inadvertent creation of any new routes that would mar the appearance of naturalness, e.g. by unauthorized off road use creating tracks that could receive repeated use, because actions including rehab of fire control lines, barriers installed where necessary near roads, routes and trails, and untreated buffers around existing roads and routes are expected to discourage unauthorized driving onto treated areas (see Issue 18).

By applying the design features for visual resources and areas with inventoried wilderness characteristics, it will be possible to meet project objectives without substantially noticeable effects to the appearance of naturalness. Treatment units will be designed to have a natural appearance with uneven boundaries that follow natural features or contours where possible and with irregular islands of untreated vegetation. Some aspects of the Proposed Action may temporarily affect the appearance of naturalness for the average visitor, such as piles that will have to cure for a year before they are consumed by burning. Stumps will appear unnatural when pinyon or juniper is cut. The effect will be minimized, however, because they will low cut (less than 4”). Slash piles will be burned on stumps to consume them when possible. In areas where the slash is visible from key observation points, the use of chipping will lessen this effect. See the analysis for visual quality (Issue 19) for the Proposed Action for a detailed discussion of how each treatment method may affect visual elements of the landscape.

The treatments are designed to reduce the risks of further ecological departure, cheatgrass conversion, and uncharacteristically severe wildfires outside the range of natural variability that are discussed for the No Action Alternative and in Issues 1 and 5. This would have a long term

beneficial effect on the naturalness of the lands with wilderness characteristics by possibly preventing the conversion to non-native species or the loss of ecological systems characteristic of the area to the effects of repeated severe wildfires outside the range of those that the ecological systems are adapted to.

**Outstanding Opportunities:**
Solitude:
In these five inventory units, pinyon and juniper are generally associated with steep ridges, hills, and canyons providing topographic screening that contributes to the sense of solitude along with the vegetative screening provided by conifers. Removing some of the conifers may result in a slight, very site-specific loss of sense of solitude in some locations, but a sense of solitude would still exist overall in each unit. The design features require that the units be small so that this effect will be minimal. All other effects of the Proposed Action to solitude would be temporary, and would involve the presence of personnel and equipment during implementation of vegetation treatments. The noise created by mowers, chippers, chainsaws, etc. could affect a wide area (potentially up to ½ mile for chainsaws, depending on terrain and wind conditions) for a short time (up to 2 weeks per treatment).

Primitive and Unconfined Recreation:
Opportunities for primitive and unconfined recreation identified in these five units include mule deer hunting, birding and other wildlife viewing, ski touring, dogsledding, pinyon nut gathering, cross-country hiking, horseback riding, snowshoeing, and photography. There are no hiking trails or other designated or maintained recreation amenities.

The Proposed Action may help maintain or improve opportunities for hunting and wildlife viewing by improving wildlife habitat, which may result in stable or increasing wildlife populations (see Issue 12). Older pinyon would not be removed in the Proposed Action and the opportunity to participate in that activity would still exist in the area. Some younger pinyon trees that have expanded into shrublands will be removed on lands with wilderness characteristics but not enough to affect the availability of pine nuts. Otherwise, opportunities for primitive and unconfined recreation are not expected to change as a result of the Proposed Action. Potential minor effects to the quality of recreation experience are addressed under “Naturalness” and “Solitude” above.

**Supplemental Values:** Analyses of effects to wildlife, visual, and cultural resources found that there would be benefits to these resources due to the reduced risks to the ecological systems due to ecological departure and high risk vegetation classes, conversion to cheatgrass and uncharacteristic wildfire. Populations of greater sage-grouse, pygmy rabbit and mule deer may benefit. Visual and cultural resources will have less risk of being negatively impacted by severe wildfire.

*Cumulative Effects*
There are no past, present, or reasonably foreseeable actions that would have an effect on wilderness characteristics. See the cumulative effects analysis for the No Action Alternative.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

If the increased acreage alternative is implemented approximately 5,730 acres of lands with wilderness characteristics would receive treatment. The effects to lands with wilderness characteristics expected under the Proposed Action would be the same under this Alternative. Because more acres will be treated, those beneficial effects to wilderness characteristics described in Alternative 2 would be of a greater magnitude. Correspondingly, the temporary negative effects that may affect the appearance of naturalness and opportunities for solitude would occur over a larger area.

*Cumulative Effects*

There are no past, present, or reasonably foreseeable actions that would have an effect on wilderness characteristics. See the cumulative effects analysis for the No Action Alternative.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

If the CWPP WUI Alternative was implemented, approximately 2338 of the 23378 acres of lands with wilderness characteristics in the project area would receive treatment. The effects to lands with wilderness characteristics would be similar to the effects expected under the Proposed Action. Because fewer acres will be treated, those beneficial effects to wilderness characteristics described in Alternative 2 would be diminished. Correspondingly, the negative effects to the appearance of naturalness and opportunities for solitude that would temporarily occur on lands with wilderness characteristics when they were being treated would occur on less land area.

*Cumulative Effects*

There are no past, present, or reasonably foreseeable actions that would have an effect on wilderness characteristics. See the cumulative effects analysis for the No Action Alternative.

*Alternative 5: Limited Treatment in WSAs*

*Direct, Indirect and Cumulative Effects*

The amount of treatment in lands with wilderness characteristics under this Alternative would be essentially identical to the Proposed Action because the reductions are all within designated WSAs. Effects to lands with wilderness characteristics therefore are expected to be very similar to the Proposed Action. Inventoried lands with wilderness characteristics could receive treatments with all of the methods included in the Proposed Action. There might be an overall reduction of beneficial effects to naturalness because treatments are necessary across the entire landscape to affect the fire regime (see Issue 5).

*Alternative 6: No treatment in WSAs*

*Direct, Indirect and Cumulative Effects*

The treatments under this Alternative in lands with Wilderness Characteristics would be identical to the Proposed Action because the only difference is inside designated WSAs. The direct, indirect, and cumulative effects to lands with inventoried wilderness characteristics would be nearly identical to those in Alternatives 5 above. The only difference from the effects of the Proposed Action would be a potentially reduced beneficial effect to naturalness due to the lack of landscape-wide treatments to moderate the fire regime as discussed in Alternative 5 above.

## Land Status:

***22. What is the status of the land transfer to State Parks and what will the effects be on those lands?***

A Recreation and Public Purpose Act (R&PP) application for recreational use for public land surrounding the Bodie State Park was submitted by the State of California, Department of Parks and Recreation on July 24, 1999. This application if approved would result in a sale (land value would be considered "free") to the State for up to 364 acres. Processing of the application would begin when the required resource studies have been completed.

The R&PP proposed land transfer to the State of California is not within the scope of this Programmatic EA. The land transfer has not been finalized.

The impacts of the alternatives to lands that might be involved in the State of California R&PP application are the same as those described for the entire project area in this EA.

## Analysis Process:

***23. How can the effects to specific resources be predicted if the treatment units with prescriptions are not yet identified?***

This issue is the same for all action alternatives so it is not analyzed separately for each one.

This analysis is a programmatic level analysis. The reasons for using a programmatic EA for this project are described in Chapter 1 in the Programmatic Scope section. This EA analyses as many of the potential site specific effects as possible at the landscape scale. Although the exact location of each treatment is not specified, the characteristics of the sites that can be chosen are described. The vegetation ecological system is specified which determines some of the physical attributes of the site including soil and elevation ranges as well as the potential plant communities and dynamics. Further, the states of those ecological systems that will be treated are identified including cover ranges for specific species present on the site (see Appendix B Ecological System Descriptions). These ecological systems and states have been mapped in the TNC analysis (see Figure 16). Due to possible errors in the remote sensing and mapping process, the vegetation state descriptions will be used to identify units on the ground rather than the mapped state. Further, as vegetation continues to change due to succession and disturbance, the areas from which treatment units could be chosen will change. This makes it impossible to both analyze the combined effects of this program of vegetation restoration at the landscape scale and also map each of the treatment units in advance.

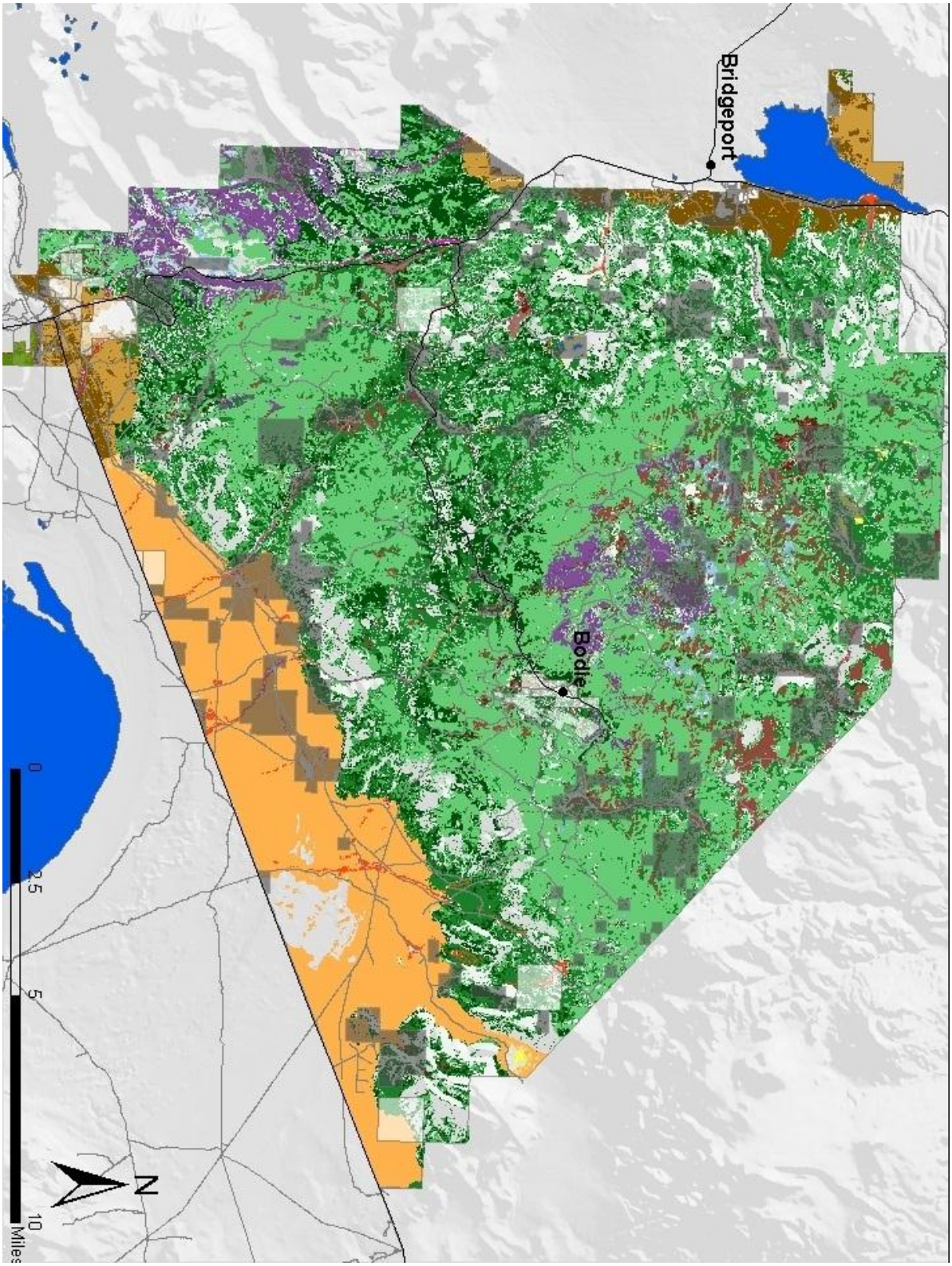



**Figure 16.** Map of target ecological systems and states for treatment as mapped in 2007. Provided for reference only. Mapping classification has a certain error rate and conditions will change, so the vegetation state on the ground will determine eligibility for treatment.

**Figure 17.** Legend for preceding map of target ecological systems and states.

Design features further restrict where treatments can be located in order to avoid impacts to sensitive resources such as rare plants, vulnerable wildlife habitat, cultural resources and visually important places (see the Design Features in the Proposed Action). These design features allow BLM to analyze the effects to these sensitive resources because it is known that adverse impacts will be avoided by relocating the treatment or using a treatment modification.

The criteria for selecting a treatment method also provide sideboards for the analysis even if the treatment locations are not yet selected. These method selection criteria describe the kind of sites where certain methods will not be used because of potential negative effects such as fall broadcast burning where there is widespread cheatgrass in the understory that could increase with fire. They also describe site types where certain methods would be the preferred method such as using prescribed burning in WSAs to maintain their natural character.

If one of the action alternatives is chosen for this EA, there is still another level of decision to be made before a treatment is authorized. The process for making these decisions on site specific treatment locations and methods is located in *Analysis Process for Subsequent Tiered Decisions on Treatment Units* section of Chapter 1. Those decisions will be tiered to this EA. If a Determination of NEPA Adequacy (DNA) finds that all the conditions of the specific site have been adequately analyzed in this EA then the decision can be made without further NEPA analysis. If there are unique aspects to the site that are not analyzed here or go beyond the conditions analyzed here, further NEPA analysis will be required with public input.

***24. How does the adaptive management plan take into account long term effects?***
This issue is the same for all the action alternatives so it is not analyzed separately for each one.

This issue was raised by the public with specific reference to the front loaded scenario that is discussed in the TNC report. That scenario involves doing more treatment in the first few years to get a head start on moving the ecological systems in the desired direction. It was not selected as an alternative to be analyzed in detail (See Alternatives Not Analyzed in Detail), however, it is worth discussing the issue of adaptive management and long term effects for all the alternatives analyzed which do not front load the treatments in the first few years.

Adaptive management is a key component of this project and one of the reasons for a programmatic level EA which does not identify exact treatment locations. Having all the criteria for selecting treatment locations but setting inflexible locations and treatment prescriptions allows for adaptive management to take place. Treatment locations and methods can be modified within the sideboards in the selected alternative as monitoring data on previous treatments is obtained. All treatments will be qualitatively monitored to ensure that they have achieved the desired effects. In addition more quantitative methods will be used to monitor a subset of the treatment units. As each treatment unit is identified it is entered into a pool for sampling according to the monitoring plan. Treatment units in each vegetation type will be selected for monitoring. After treatments are implemented, follow-up monitoring will be done in those same locations. If the results of that monitoring show that the desired effects are not being achieved, then the future treatments will be modified using the options available in the selected alternative to avoid the conditions that lead to that failure to achieve the desired conditions.

Long term effects will take a while to show up in the monitoring and will not be avoided for all the treatments that had been implemented in the meantime. However, all the treatment methods and designs that are proposed here are not experimental and have been implemented for many years in the BIFO area and throughout the Great Basin. Any potential long term adverse effects that have been observed in similar projects in the past are incorporated into this analysis. This

ensures that the risk of long term negative effects that are unknown is low. If anything unexpected does occur, the monitoring program that is part of this project will identify those effects as soon as possible and allow the BIFO and others throughout the region to modify their practices. Any changing conditions that require design features or modifications outside of the ones that are in this analysis will require a new NEPA analysis and decision to ensure that they are fully analyzed and that the public is given an opportunity to have input.

## Analysis Required by Other Authorities

## Areas of Critical Environmental Concern (ACECs)

*Background*
The Project Area includes three ACECs: Bodie Bowl, Travertine and Conway Summit. The acreages given are the latest from the BLM GIS database and may differ slightly from numbers in the RMP or older references that used less precise mapping methods.

Bodie Bowl ACEC:
The Bodie Bowl ACEC consists of 6,054 acres of BLM lands surrounding the Bodie State Historic Park. The goals of the ACEC are to preserve the existing historical integrity of the Bodie National Historic Landmark and to protect scenic values. The Bodie Bowl ACEC Management Plan (1995) directs the BLM and signatory agencies to manage the area for its physical and ambient historic values, preserving "the Bodie experience" for existing and future visitors to enjoy.

Travertine ACEC:
The Travertine ACEC consists of 159 acres around Travertine hot springs near Bridgeport. There is a management plan for the ACEC (BLM 1995). The goals of the ACEC are enhance recreation and to protect special status species habitats, unique geologic features and cultural and Native American values. Activities that are necessary to maintain the integrity of the natural environment are allowed.

Conway Summit ACEC:
The Conway Summit ACEC consists of 2689 acres near Conway Summit. There is no plan completed for the ACEC. The Bishop RMP includes direction for the management of the ACEC (USDI BLM 1993a). The goals of the ACEC are to protect scenic values and to enhance dispersed recreation opportunities. Other target resources for the ACEC include riparian habitat. The ACEC has a VRM 1 standard to protect the scenic values.

*Alternative 1: No Action*
*Direct and Indirect Effects*
Under the No Action Alternative no treatments would be implemented in the ACECs therefore there would be no direct effects. The indirect effects of continued ecological departure, increased risk of severe wildfire outside the natural range of variability, and the risk of conversion to non-native annual grasses would continue.

Bodie Bowl:
See the analysis of issues number 1 and 18 which address the effects to air quality and visual resources in the area of the Bodie ACEC. The increased risk of severe wildfire would be a threat to the National Historic Landmark. The historic structures of the town of Bodie are very vulnerable to fire.

Travertine:
The pinyon expansion and infilling that has affected the outer edges of the ACEC would continue but the unique habitats associated with the thermal features would not be affected.

Conway Summit:
The indirect risk of severe wildfire could have a negative impact on the scenic resources of the ACEC. The aspen stands that are characteristic of the ACEC would likely respond well to wildfire events, but the montane sagebrush ecological system around them is vulnerable to cheatgrass conversion with severe wildfire.

*Cumulative Effects*
There are no other past, present or reasonably foreseeable actions in the ACECs that would have a cumulative effect in combination with this alternative.

*Alternatives 2, 3, 4, 5, and 6: Action Alternatives*
*Direct and Indirect Effects*
All the action alternatives are the same for the Travertine and Conway Summit ACECs. The actions in the Bodie Bowl ACEC are slightly different and the differences are noted in the analysis for that ACEC below.

Bodie Bowl:
The treatments in the action alternatives would help protect the resources of the National Historic Landmark from wildfire. Alternative 2, the Proposed Action, calls for a fuelbreak to be constructed and maintained around the State Historic Park. Design features included would help to blend the treatments into the landscape so that the visual resources would not be negatively affected (see Issue 19). Prescribed burning would be used to a very limited extent to limit any risk to the wooden structures nearby. Therefore there would not be a large amount of smoke produced that would affect the air quality and the health of the visitors and resident staff at the Park. Air quality design features for burning throughout the project would also help protect the air quality (see Issue 17).
Under Alternative 3, the Increased Acreage Alternative, the fuel break would be created using targeted grazing. The effects would be similar to the Proposed Action. The appearance of grazed vegetation might have less of an impact on visual resources than mowing in the Proposed Action.
Alternative 4, the WUI Alternative would be identical to the Proposed Action for the Bodie Bowl area because the State Historic Park is considered to be a part of the WUI.
Alternatives 5 and 6, the WSA alternatives, would involve fewer acres treated in the ACEC and an incomplete fuelbreak around the State Historic Park because the Bodie WSA borders one side of the Park. Alternative 5, the Limited Treatment in WSAs Alternative allows for treatment in WSAs but only uses prescribed burning techniques which would have too high a risk close to the park without some mechanical treatment beforehand. Alternative 6, the No Treatment in WSAs

Alternative does not allow for any treatment in WSAs. Without a complete fuelbreak around the Park the risk of loss from wildfire would be higher.

Travertine:
All of the action alternatives are the same in the Travertine ACEC. Almost no treatment would occur within the ACEC because the unique ecological systems that occur in association with the hot springs are not among the ones proposed for treatment. Small areas of Wyoming sagebrush sites now dominated by pinyon may be treated but do not include the habitats with the unique values that the ACEC is designed to protect. The project would not affect the target values of the ACEC but would benefit some of the ecological systems of the park (see Issue 1).
Conway Summit:
The action alternatives are all identical for the Conway Summit ACEC. Nothing in any of the action alternatives conflicts with the direction for the ACEC. Visual resources are protected by the visual resource design criteria and treatments in the Conway Summit area will conform with VRM1 standards (see Issue 19). None of the alternatives will have any effect on recreation opportunities. The small amount of treatment of riparian habitats in the action alternatives is expected to improve the condition of the riparian habitats especially aspen stands (see Issues 1, 15, and the Wetlands and Riparian Zones Analysis later in this section).

*Cumulative Effects*
There are no other past, present or reasonably foreseeable actions in the ACECs that would have a cumulative effect in combination with the action alternatives.

## Cultural and Historic Resources

*Background*
Ethnography
The two groups of Northern Paiute speakers currently inhabiting the vicinity of the proposed project area documented ethnographically and currently living in the region are the Mono Lake Kutzadikaä Paiute (*Cuzavi-dika*) brine fly (larvae) eaters on the southern fringe of the Bodie Hills in the Mono Basin, and the Bridgeport Valley Paiute (*Paxai-dika)* chub eaters (Davis 1965; Fowler and Liljeblad 1986; Steward 1933). Northern Paiute groups were identified by the major food sources their region contained. Therefore, the people who occupied these areas were the eaters of that resource (Arkush 1989 ).

The Bridgeport Indian Colony members currently inhabit the Bridgeport Valley, traditionally referred to as Big Meadow, a summer gathering place, with many of the inhabitants originally from Mono Basin (personal communications, R. Andrews 2012). Chub (*Paxai*) were gathered by the local inhabitants and were probably collected from the East Walker River, or any shallow water body creating suitable habitat.

The Mono Lake Kutzadikaä are currently seeking Federal recognition and are known prehistorically, to inhabit the Mono Basin and south toward the Long Valley caldera (Steward 1933). Kutzadikaä collected brine fly larvae (*Cuzavi*) from Mono Lake, harvested the Piagɨ caterpillar (*Piaga)* from the Jeffrey pine groves, and utilized pinyon pine nuts as a year round

food source and as a trade good (Aldrich 1921; Eldredge 1923; Davis 1965; personal communications, R. Andrews 2013).

The project area is also within the ethnographic territory of the Penutian speaking Miwok, who traversed the Sierra from the west for purposes of trade, and the Hokan speaking Washo who traveled from the northwest to exploit resources on the periphery of their nuclear homeland (Hall 1980). The Bodie Hills were accessed via trail systems or travel corridors enabling access from numerous directions to what was considered a neutral zone (pers. comm. Raymond Andrews, 2013). This influx of people created trade relationships and inter-marriage with nearby groups. Examples of items produced by Paiutes for trans-Sierran trade included Bodie Hills obsidian, pumice, salt, pinyon nuts and other items such as sinew backed bows, which were exchanged for acorns, manzanita berries, and shell beads (Fletcher 1987; King 2008).

Obsidian

The dominant archaeological features within the proposed project area are obsidian workshops associated with Bodie Hills cobble flows. These cobble flows encompass nearly 8,000 acres within the project area and were utilized by prehistoric peoples throughout the Holocene (the last 10,000 years) (Halford 2008).

Pinyon

Early historical accounts, such as those by J. C. Fremont while he and his men crossed the Great Basin circa 1849, document pinyon, as being a staple food source of the country which was offered as food, and traded (Jackson and Spence 1970; Anderson 2006). In1940, Levi Burcham indicates that pinyon were widely spaced in groves used by tribes in nut production when white settlers first arrived, stating that the spacing "lessened the danger of damage from fire, insects, and disease" (Anderson 2006). Also, according to Burcham (1982), with proper management of the pinyon woodlands "the pinyon tree could serve two compatible purposes, nut production and watershed protection – goals that Native American tribes had fostered for many generations" (Ibid).

Evidence indicates that Great Basin tribes traditionally harvested cones, just as pinyon continues to be harvested today by hooking the limbs and removing green cones, or waiting for the cones to open and whipping the tree with a pole, removing the cones or knocking the nuts out of the mature dried cones (Anderson 2006). With either method the dead or dying branches were pruned back, a practice the Timbisha –Shoshone and Washoe say were "good for the trees." The Shoshone traditionally pinched off or broke the growth tips by hand on lower branches. This combined with the breaking of the growth tips higher on the trees during the whipping process was also beneficial, according to the Timbisha-Shoshone, as it fostered the production of one or two new growth buds (Fowler 1996).

The general pinyon woodland structure may in fact have been human created, a result of native pruning, tending and burning. Ancestral burning on the east side of the Sierra Nevada indicates that fire was used to increase foods such as wild onions, elderberries, and caterpillars and to clear out underbrush to bring in new growth for the animals. Specific to pinyon was the practice of burning every three years to increase cone production and keep them from losing pinyon to large fires. (Pers. Com. With Jack Lundy 1990; Anderson 2006).

Pinyon nuts are still gathered by the Washoe, Paiute, Mono, Shoshone and other tribes. Nuts are eaten raw or roasted in their shells and eaten as a snack. They are also parched, shelled, and parched again, pulverized into flour and made into cakes or soup. (Anderson 2006).

Historic Era

Historic era development in the project area occurred in the 1850's and 1860's, following a series of gold strikes in the area, including Dogtown, Monoville, Bodie, Masonic, and Aurora (King 2008). Remnants of the Bodie town site now exist as Bodie State Historic Park, functioning today as an interpretive site for visitors to enjoy. Bodie Historic District was listed on the National Register of Historic Places in 1966, and is listed as California Historical Landmark No. 341(NRHP Listings Mono County, CA). The mining boom at Bodie ended around 1915 although the last mine did not close until 1942. At various times in the modern era mining has again become economically feasible in the Bodie Hills and has been active. There is no current mining activity in the Bodie Hills.

Historic ranching developed in the local area concurrently with the mining boom. Ranches were mostly based in the Bridgeport Valley but rangelands throughout the region were used for grazing including the Bodie Hills. This ranching activity supplied the needs of local and regional populations that came to the region in search of gold. Some of these historic family ranches such as Hunewill and Centennial/Dressler in Bridgeport Valley are still active. Grazing allotments within the Bodie Hills still support both sheep and cattle production today.

The mining industry required large amounts of lumber for production and day-to-day operations; squared timbers for mine shafts, shingle wood for building construction. The bulk of the lumber was cut and milled at Bridgeport; some also came from Benton, Adobe Meadows and Carson City. Transportation costs were high, so mining companies began looking to exploit closer untapped sources of construction lumber.

The primary of these lumber sources became Mono Mills, located south of Mono Lake and east of Mono Craters; a 12,000 acre tract of land acquired by a consortium of the more successful Bodie mining firms. The 'Mill" at its high point of production, had capacity to turn out 80,000 feet of lumber every ten hours (Billeb, 1986). By far the greatest demand was for cordwood to provide steam power for hoisting works, stamp mills and drainage pumps. This equipment, typical to a single operation could consume up to 20 cords of wood per day (Sprague 2003).

Pinyon Pine which was the primary fuel source grew in a number of places around Bodie. East of Bodie, the biggest stands were located on the flanks of Mono Basin; Trench Canyon and smaller patches east, southeast and west of Mono Lake (Fletcher, 1987). This pinyon harvest occurred in the historic pinyon woodlands and the stumps can still be observed today in where the groves have regrown. It is important to note in the context of this EA that these historic groves are not one of the ecosystem types that will be treated in any of the alternatives.

Jeffrey pine cordwood produced by Mono Mills reduced the demand for pinyon but did not eliminate it entirely. Pinyon, referred to as 'pine-wood' produce a much hotter temperature than Jeffrey pine, and so continued to be harvested even during full production phase of Mono Mills.

The resource exploitation associated with the mining boom in the Bodie Hills and larger Mono Basin took its toll on the Native population. Large-scale cutting of pinyon affected the Mono Lake Kutzadikaä , who subsisted largely on pinyon nuts during the winter. The clearing of Jeffrey Pine in the Mono Mills likely affected the Kutzadikaä ability to harvest Piaga caterpillar, another food source for the Kutzadikaä (Fletcher, 1987).

Previous Cultural Resource Studies

BLM Class III cultural resource survey inventory and assessments are conducted prior to any federal undertaking to determine location and potential to effect to cultural resources that may be located within the proposed project area (see Alternative 2 design features). To date, Cultural resource surveys within the proposed project area have covered approximately 34,000 , acres and generated a total of 53 surveys and assessments.

Earlier surveys of the region through the efforts of Julian Steward in the 1920-1930s in the Owens Valley, and Emma Lou Davis during the 1960s in the Mono Basin assisted in establishing a framework for study of Native American prehistoric chronology and ethnography. In the 1970s, research was driven by the need to fulfill requirements of various environmental impact assessments, and cultural resource management dominated the bulk of the archaeological research (Kobori et al. 1980). These investigations established a baseline for future research and BLM cultural resource management in the Bodie Hills. Results of these surveys were used to formulate a predictive model for site types within the various vegetation types and outlined management recommendations for future strategies for preservation of cultural resources.

*Alternative 1: No Action*

*Direct and Indirect Effects*

Implementation of the No Action Alternative would not directly affect cultural resources because this alternative is simply a continuation of currently authorized activities. However, indirect adverse effects to cultural resources could occur within the proposed project area as a result of increased risk of periodic high-intensity wildfire. Current vegetation conditions within the proposed project area are departed from historical levels, allowing for the possibility of high-intensity wildfires, posing unmanageable threats to the cultural resources within and adjacent to the proposed project area. Increased fuel loads offer longer heating times, and as temperatures increase, so do effects to cultural resources, and effects increase as the length of time exposed to heat increases (Deal 2006). High intensity wildfire has potential to impact a variety of cultural resources via spalling or cracking of rock features such as petroglyphs (scratched or pecked images), and pictographs (images created with pigment), loss of obsidian hydration data-which is an important dating technique for establishing site chronologies, and complete loss of organic wood features and artifacts associated with prehistoric and historical era human habitation within the project area. Loss of valuable research data utilized to address regional prehistoric land-use patterns, with an emphasis on chronology, mobility and subsistence strategies would likely occur.

Current fire suppression strategies can be effective in reducing overall acreage burned; however, recent wildfires since 2002 to present, have proven that, wildfires have potential to become large and complex. The analysis of Issue 5 shows that due to the departed ecological conditions and climate change, wildfires are expected to be larger and more severe under the No Action

Alternative. Under these conditions, land management agencies cannot adequately address the long-term protection of cultural resources from the threat of damage or loss to wildfire. A future wildfire would likely burn through these woodland areas at high intensity and the degradation of data quality reflective of past human behavior and in some cases the permanent outright loss of prehistoric and historic era sites should be anticipated.

Wildland fire suppression actions themselves also have potential to affect or destroy cultural resources. Initial Attack response for suppression of wildland fire includes use of heavy equipment for constructing firelines. Also, construction of staging areas for fire personnel and firefighting apparatus, as well as back-firing operations for fire breaks have the potential to unintentionally adversely affect cultural resources.

Other potentially adverse effects to cultural resources resulting from wildfire suppression includes direct application of retardants, foams, and water; rapid cooling (e.g. rock art and artifact fracture), and damage or displacement to fragile features. Over the long term, retardants contain salts which may damage old, fragile wood, foams may hasten rusting on metal, and water enhancers contain desiccants and may damage wood surfaces or strip surfaces of finishes and are difficult to remove especially from old or fragile wood (Winthrop 2004).

*Cumulative Effects*

There are no other past, present or reasonably foreseeable projects that would have cumulative effects in combination with the indirect effects predicted for this alternative. The analysis of cumulative effects for Issue 1 explains that the other possible large projects in the area such as new grazing standards or a proposal for new mining operations are not reasonably foreseeable. Current and past projects have not had negative effects on cultural resources because regulations and standards require that the projects be designed to protect cultural resources. Past and current habitat improvement and fuels reduction projects in the project area have had a potential to protect cultural resources locally from the negative effects of wildfire. They would have a small positive cumulative effect to offset the possibility of wildfire damaging cultural resources, but because they are so localized it is not expected to affect the overall fire regime in the Bodie Hills or to significantly offset the risk in the No Action Alternative.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The design features in the Proposed Action to protect cultural resources will ensure that there are no adverse effects. All proposed project units will be surveyed prior to conducting a Determination of NEPA Adequacy and deciding to proceed with treatment. Final project units will be laid out to exclude cultural resource sites or use design features to protect those resources (See design features).

The Proposed Action is designed to move the target ecosystems towards a natural fire regime. The analysis of Issue 5 shows that this alternative is likely to help reduce the increasing risk of large severe wildfire in the future. This should help to protect cultural resources from negative impacts of the unusually severe wildfires that are predicted to occur in the future due to both the departed nature of these ecosystems and the effects of climate change. It will also help prevent unintended negative impacts associated with suppression efforts for large wildfires. Cultural

resources that are particularly vulnerable to severe wildfire include those that are associated with the old growth true pinyon woodlands that are now embedded in a semi-continuous belt of new pinyon growth with the potential for a wind driven crowning fire. Significant Properties such as Bodie Historic State Park, Bodie Railroad Grade, wooden buildings, components and associated proto-historic era sites with temporal features such as contact period brush shelter remnants are also at significant risk if large severe wildfires outside the natural range do occur in the Bodie Hills.

The conclusion of this analysis is that the Proposed Action is not expected to have adverse effects on cultural resources because of implementation of design features. It is expected to have the potential for positive effects on the preservation of various cultural resources in the project area through restoration of departed ecosystems and the prevention of severe wildfire. Preventing the loss of cultural resources will provide for the enjoyment of future generations and future research potential.

*Cumulative Effects*

The cumulative effects of the Proposed Action combined with smaller scale vegetation management projects already implemented, will potentially enhance the protection of cultural resources (sites) by reducing fuel loading while allowing management to continue protecting and preserving these sites. Restoration treatments will be designed to break-up continuity of fuels, potentially leading to fewer impacts to cultural resources when wildfire does occur. The effects of restoration treatments may be two-fold; not only will fuel loading be reduced within/adjacent sites, potentially leading to fewer impacts to cultural resources when wildfire does occur, but also potentially enhancing regrowth and propagation of certain plants utilized by Native American traditional practitioners. Proposed restoration treatments of manipulating vegetation, may mimic traditional burning practices, the reason most cited in a recent study of California Indian elders as prevention of large devastating fires (Anderson 1993).

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

Direct effects of increased acreage would be similar to those of the Proposed Action. Larger treatment area equates to less continuity of fuels, resulting in potential for lower fire intensity, less impacts and continued preservation of cultural resources.

Indirect effects of the increased acreage alternative would be similar to those of the Proposed Action; potentially lower burn severity during wildland fire, though the magnitude of any given fire event is unknown, there is likelihood that vegetation treatments within and adjacent sites would effectively reduce impacts to cultural resources.

*Cumulative Effects*

Cumulative effects of increased acreage would be similar to those of the Proposed Action, potentially leading to fewer impacts to cultural resources when wildfire does occur.

*Alternative 4: Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The effects of the CWPP WUI Alternative are expected to be similar to the Proposed Action where treatments are implemented. The treatments would not be expected to have any adverse impacts on cultural resources for the same reasons stated in the analysis of the Proposed Action. However, the benefits to cultural resources from mitigation of severe wildfire risk would be significantly less across the entire Bodie Hills area.

The area outside the WUI would receive no treatment, so severe wildfires would be expected to occur at the same frequency as the No Action Alternative. There would be some local protective effects of treatments when they occur near cultural resource sites within the CWPP WUI.

The area treated within the WUI is not necessarily enough to affect the overall fire regime in the Bodie Hills (see Issue 5). Wildfire activity and associated impacts to sites outside CWPP WUI boundary has potential to increase without treatments. Additionally, high intensity wildfire may have more potential to spread into CWPP WUI from adjoining lands where vegetation treatments are not being proposed under this alternative. Historic Properties in the CWPP WUI such as Bodie Historic State Park, Bodie Railroad Grade, wooden buildings, components and associated proto-historic era sites with temporal features such as contact period brush shelter remnants could be affected.

*Cumulative Effects*

The cumulative effects of the CWPP WUI are expected to be similar to the No Action Alternative because there will be no direct adverse impacts to cultural resources from the alternative and the indirect wildfire effects are expected to be similar to no treatment outside the WUI and still reduced from the Proposed Action even within the WUI because not enough of the landscape will be treated to reduce the overall fire risk.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

The effects of this Alternative are expected to be similar to Alternative 4. Broadcast burning restricted to WSA will reduce overall effectiveness of the Proposed Action, thereby increasing potential to effect cultural resources due to wildfire. Wildfire activity and associated impacts to cultural resources inside the WSA boundaries has potential to increase without the full suite of treatment methods proposed in Alternative 2. As discussed in the analysis of Alternative 4, reducing the effectiveness of the project in one area also puts the rest of the project area at higher risk to severe wildfire because of the potential for a wildfire starting in the untreated, or less treated area spreading to the treated areas once it is already a large fire.

*Cumulative Effects*

The cumulative effects of this alternative area expected to be similar to the other reduced acreage alternatives. See the analysis of Alternative 4 above.

*Alternative 6: No Treatment in WSAs*

*Direct and Indirect Effects*

No treatment within the WSA boundary would be the same as the No Action Alternative, resulting in potential loss and adverse effects to cultural resources located within the WSA's. Outside the WSAs the direct effects would be the same as the Proposed Action and indirect effects would be expected to be similar to all the other reduced acreage alternatives, see analysis of Alternative 4.

*Cumulative Effects*

The cumulative effects are expected to be similar to the other reduced acreage alternatives. See the analysis of Alternative 4 above.

## Floodplains

The effects to flood plains is covered under Issue 19 (Watershed) and the Wetlands and Riparian Section below.

## Native American Cultural Values

The BIFO began tribal consultation with Tribes of the Eastern Sierra regarding the Proposed Action in March 2011 at the earliest phases of project development. There have been multiple opportunities for interested Tribes to raise concerns regarding any potential for affects to their cultural values including multiple field trips to the project site. These field trips included visits to sites treated with the same methods proposed here to demonstrate the potential effects to vegetation types previously treated and potential for increased diversity of native plants. The BIFO has incorporated the feedback received in consultation and does not believe that there will be negative impacts to Native American Cultural Values. See also the analysis of effects to Cultural and Historic Resources above.

## Vegetation

The majority of pertinent vegetation communities and potential effects to vegetation within the Bodie Hills have been identified and the direct, indirect and cumulative effects of the alternatives have been analyzed elsewhere in this document (See Issues: 1 – 3, 4, 6 – 11 and the Wetland and Riparian Zones section). Aspen (*Populus tremuloides*) stands have not been addressed elsewhere in this document and will be addressed here.

*Background*

Throughout the western U.S. researchers have documented aspen stand decline related to a combination of reasons including altered fire regimes, domestic and wildlife browsing and conifer encroachment (Bates et al. 2006; Bartos and Campbell 1988). Fire or other disturbance in aspen stands can reduce competition and stimulate root suckering, thus benefitting aspen stands (Brown 1985).

Aspen groves are a unique and important plant community type within the Bodie Hills. They range in size from small, scattered stands to large (greater than 5 acre) complexes. Age-class distribution in these complexes is generally even-aged, primarily dominated by older trees, and there is limited recruitment (i.e., there is only a moderate to low number of juveniles. Understory vegetation is dominated by California brome (*Bromus carinatus)*, *Hordeum jubatum,*

hawksbeard (*Crepis acuminata*), *Descurania sophia,* currant (*Ribes velutinum*) and occasional snowberry (*Symphoricarpos rotundifolius*). In more impacted groves understory vegetation is dominated by *Bromus tectorum,* mullein (*Verbascum thapsus*) and nettle (*Urtica dioica)*.

Aspen Community Trend in the Bodie Hills

In 1980 aspen grove complexes throughout the Bodie Hills Management Area were assessed to describe the structural components critical for wildlife habitat and to determine grazing impacts that would reduce the ecological function of these plant communities. In the Bodie Mountain grazing allotment in 1980, 16.50% of the groves were in excellent condition, 63.25% in good, 19% in fair and 1.25% in poor condition. In 1988, a resurvey of these groves occurred and 99.8% of the groves were determined to be in fair condition. The decline of groves to a fair condition was attributed to continued livestock bedding activities within grove complexes which through time reduces understory cover and aspen sucker recruitment.

In 1995 and 1996 a sub-set of the previously sampled groves and additional groves were assessed to determine if Desired Plant Community (DPC) Criteria for aspen groves was being met. In 1996 none of the sampled groves met all the DPC criteria and in the Bodie Mountain grazing allotment 71% met 50% or less of the criteria. A resurvey of aspen groves in the Aurora Canyon grazing allotment in 1998, even after two years of cattle herding and moderate winter precipitation, still exhibited a static to decreasing trend in understory composition indicated by increases in cheatgrass cover, and other non-native plants. Stand vigor and age class diversity decline was evident throughout the complex. Some juvenile (sucker) recruitment was evident on the grove periphery, but these were heavily herbivorized. Groves that do not meet 50% or more of the DPC's are at risk of losing critical components necessary for wildlife and overall plant community function. Many of the aspen in the highly impacted groves also tend to exhibit high densities of diseased trees indicated by leaf blight and cankers. Although some aspen clones may or may not have a propensity for such disease susceptibility, intensive soil churning and removal of understory species may adversely affect the microclimatic characteristics of a stand enough to increase overall tree stress.

Since 1996, aspen condition in the Rancheria Gulch grazing allotment has improved because of active sheep herding. Improvements include increases in understory cover as well as new aspen sucker recruitment.

Since 2004, select aspen stands in the neighboring Dunderberg Creek, Green Creek and Virginia Creek drainages (west of Highway 395) have been treated with either conifer removal or prescribed fire to open up the understory and encourage suckering. Research by Krasnow et al. (2012) has documented that five years after treatment, two of the three sites where conifer were mechanically removed showed significant improvement, compared to control sites in terms of density of total stems and in two of three regeneration size classes. Three years post treatment, the prescribed burn sites showed significant increases in total stem density, as well as increases in two of the regeneration size classes. Krasnow's research indicates that both conifer thinning and prescribed fire can improve aspen stand condition. However, care should be taken to minimize adverse effects to aspen including sun scald following treatments and herbivory to new sprouts (2012).

*Alternative 1: No Action*

*Direct and Indirect Effects*

The No Action Alternative would result in no direct effects to aspen groves because no programmatic vegetation restoration program would be implemented. Aspen groves may however be treated in the future as part of a separate aspen improvement project, effects of any such project would be analyzed in a separate NEPA document; no other projects are planned at this time. Some stands may also be affected by wildfire, it is expected that this would result in aspen suckering and increased vigor.

The No Action Alternative would result in indirect effects to aspens stands. In the absence treatments it is expected that aspen stands would maintain their current state in the short term but in the absence of wildfire or prescribed treatments, stand vigor and age class diversity would gradually decline. In the long term this decreased vigor and loss of age class diversity may result in shrinking and unhealthy aspen stands. However, based on modeling (Issue 1) it is predicted that the ecological departure of Stable Aspen will likely remain about the same and the high risk classes are likely to decrease over the next 50 years. This is due to the increases in wildfire frequency that were predicted in the model.

*Cumulative Effects*

The Cumulative Effects analysis area is the same as that identified in Issue 1. Potential actions or events that may have a cumulative effect on aspen stands when an added to the No Action Alternative are expected to be the same as those identified in Issue 7 (Sensitive Plants). It is expected that those effects would influence aspen stands in a similar manner.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The Proposed Action is expected to be an overall benefit to aspen stands in the Bodie Hills. Because fire can stimulate aspen suckering and treatments would reduce competition from other vegetation, aspen stands are likely to improve. Research in the eastern Sierra indicated that disturbances such as fire or thinning can be effective restoration tools. The authors also noted that aspen stands that had experienced severe wildfires had hundreds of aspen seedlings (Krasnow, Halford et al. 2012). Bates et al. found that fall prescribed burning resulted in good aspen suckering (Bates, Miller et al. 2006).

Treatment may result in some adverse effects to individual aspen trees. Krasnow indicated that some mortality to aspens may result from treatments due to sun scald or increased herbivory. However, if monitoring indicates that treatments are not beneficial, they will be modified or discontinued. Overall it is believed that treatments would benefit aspen by reducing completion from pine trees and increasing aspen suckering and age class diversity.

*Cumulative Effects*

See Cumulative Effects analysis for Issue 7. Cumulative effects to aspen are expected to be similar.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The direct and indirect effects to aspen as a result of the Increased Acreage Alternative are expected to be similar to those of the Proposed Action because they would treat the same number of acres of aspen (500) and would follow the same methods, method selection criteria and design features.

*Cumulative Effects*

Because the direct and indirect effects are the same as the Proposed Action, the cumulative effects are also expected to be same. See Cumulative Effects of the Proposed Action above.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*

*Direct and Indirect Effects*

The Direct and Indirect effects to aspen are expected to be similar to the Proposed Action because the same methods, method selection criteria and design features would be followed. The overall effects to aspen stands in the Bodie Hills would be less than the Proposed Action due the decrease in treatment acres (230 acres compared to 500 acres).

*Cumulative Effects*

See Cumulative Effects of the Proposed Action.

*Alternative 5: Limited Treatment in WSAs*

*Direct and Indirect Effects*

The Direct and Indirect effects to aspen are expected to be similar to the Proposed Action because the same methods, method selection criteria and design features would be followed. The overall effects to aspen stands in the Bodie Hills would be slightly less than the Proposed Action due the decrease in treatment acres (375 acres compared to 500 acres).

*Cumulative Effects*

See Cumulative Effects of the Proposed Action.

*Alternative 6: No treatment in WSAs*

*Direct and Indirect Effects*

Outside of WSA's, alternative 6 would have very similar results to those discussed in the Proposed Action Alternative. Within WSA's the effects would be similar to those discussed in the No Action Alternative. Nearly half of the Stable Aspen stands within the project area fall within WSA's therefore less than half of the proposed acres of aspen would be treated with this alternative.

*Cumulative Effects*

Cumulative effects of the No treatment in WSAs Alternative are predicted to be similar to those discussed in Alternative 1 and 2 (see above).

## Threatened and Endangered Vegetation

There are no federally listed Threatened or Endangered plants that occur or have the potential to occur in the project area. Potential effects to Sensitive plants are analyzed in Issue 7.

## Threatened and Endangered Wildlife

Effects to wildlife species that are not federally threatened or endangered are analyzed in the issues 12-14 above.

***Sierra Nevada bighorn sheep* (*Ovis canadensis sierrae*)**

The Sierra Nevada bighorn sheep (SNBS) is listed as federally endangered. The southwest corner of the project area overlaps with 11 acres of designated critical habitat for SNBS. A small number of SNBS have been documented in this southern corner of the project area, but the majority of use occurs outside the project area. SNBS spend much of their time above treeline in the alpine environment and are generally found in visually open habitat that provides steep rocky terrain for escape from predators.

***Lahontan cutthroat trout* (*Oncorhynchus clarki henshawi)***

The Lahontan cutthroat trout (LCT) is federally threatened and is not currently found in the project area. There is potential habitat in the Rough Creek watershed (Rough Creek, Atastra Creek and Bodie Creek). This watershed has the greatest potential to support Lahontan cutthroat based on current habitat quality and the presence of a naturally producing rainbow trout (*Oncorhynchus mykiss*) population. The majority of this potential habitat is on private land owned by the permittee.

*Alternative 1: No Action*

*Direct and Indirect Effects*

As described in issue 5, taking no action is likely to result in increasing wildfire, in terms of greater area and severity. Because LCT do not occur in the project area and no reintroductions are planned at this time, any negative impacts related to increased fire risk, such as increased erosion and sedimentation into the watershed, would be minimal. Similarly, SNBS are generally found outside the project area and in low risk habitats above treeline, therefore negative impacts from potential increases in fire severity in the project area would be minimal.

*Cumulative Effects*

No cumulative effects are expected because impacts from the No Action Alternative are negligible and therefore past, present and future actions would not increase impacts to these species.

*Action Alternatives*

*Direct and Indirect Effects*

There may be minor beneficial results if treatments reduce fire risk. However, because these species do not currently occur in areas proposed for treatment, any benefits would be limited. There will be no impact to critical habitat for SNBS because no treatments will occur in critical habitat. No treatments are planned in the areas adjacent to the critical habitat either as they do not contain ecological types targeted for treatment. Additionally, any treatments in the project area will be planned to avoid negative impacts to SNBS and LCT. If a site specific treatment is planned that may affect these species, consultation with the USFWS would occur.

*Cumulative Effects*

No cumulative effects are expected because impacts from the action alternatives are negligible. Therefore past, present and future actions would not increase impacts to these species.

## Water Quality

Effects to vegetation, soil, wetlands/riparian zones and watersheds are important and components of water quality. Those effects are analyzed in Watersheds under Issue 15 and under Vegetation, Soil, and Wetlands/Riparian Zones within this document.

*Background*

For the Bodie Hills proper or the east side of Highway 395 within the project area, perennial surface water is found in the form of numerous small springs, seeps, and streams. Perennial creeks associated within the project area are Clearwater Creek, Bodie Creek, Atastra Creek, Rough Creek, Tributaries 2 & 4 of Rough Creek, Aurora Canyon Creek, Clark Canyon Creek, and Hot Springs Canyon Creek. Intermittent creeks are Bridgeport Canyon Creek, Cottonwood Canyon Creek, Little Mormon Meadows Creek, East Fork of Atastra Creek, and Tributaries 1 & 3 of Rough Creek. Surface springs include Warm Springs, Big Alkali, Travertine Hot Springs, Logan Spring, Kirkwood Spring, Waford Spring, Murphy Spring, Coyote Spring, Rancheria Gulch Spring, and other unnamed springs. Many of these springs, seeps, and streams are located on private lands.

During the 1978-1979 resource inventory for the BIFO, water quality for the streams was observed once with limited on-site tests at all streams; and a subset of these streams underwent laboratory testing for a limited number of constituents (USDI BLM 1978-2013). Several streams were also tested for water quality three times in 1984 and twice in 1985 (USDI BLM 1986a). In 1986, the BLM conducted an inventory of water source condition and water quality on most natural springs (USDI BLM 1986b).

The 1978-1979 stream survey found levels of iron and manganese that exceeded drinking water standards in streams in several places, likely due to basic soil chemistry rather than any management variables. Water chemistry was otherwise good for the measured constituents. High turbidity was noted in Rough Creek Tributaries 1, 2 & 3, and Aurora Canyon Creek (USDI BLM 1978-2013).

In general, the 1984-1985 water quality surveys found that chemical water quality was fairly good in the Bodie Hills. Water quality was being affected by livestock grazing, mining, and recreation use. All streams sampled had naturally high, but not harmful, pH levels. Iron exceeded drinking water standards but remained below toxic levels for Clearwater Creek and Aurora Canyon Creek. There was historic mining activity at the headwaters of Bodie Creek along with a dam. Mercury and arsenic levels were high in Bodie Creek (and in samples from the Aurora Canyon mill site in 1990 and 1995), tentatively attributed to historic mining and milling practices but possibly naturally occurring. Other measured chemical parameters were at levels meeting primary or secondary safe drinking water standards (USDI BLM 1978-2013).

Fecal coliform was not measured but levels were likely higher than allowed under safe drinking water standards based on values sampled at sites west of Highway 395 with less livestock use.

Excessive summer water temperatures for cold water aquatic species were found in Clearwater Creek, Bodie Creek, Little Mormon Meadows Creek, Rough Creek, and Aurora Canyon Creek. Excessive turbidity for aquatic life was found in Rough Creek, Little Mormon Meadows Creek, Aurora Canyon Creek, Hot Springs Canyon Creek, and Clearwater Canyon Creek. A 1999 aquatic habitat evaluation on upper Bodie Creek also found high temperatures and turbidity (USDI BLM 1978-2013).

Stream riparian inventories in 1988 identified other manmade alterations including roads and minor diversions posing negative affects to streams. These apparent water quality impacts included headcutting, gullying, sheet erosion, and bank collapse. Apparent water quality impacts included algae growth and suspended sediments (USDI BLM 1978-2013).

For the west side of Highway 395, a Domestic Water Analysis involving numerous other water quality constituents was performed on Dog Creek, Green Creek, and Virginia Creek. This one time intensive analysis found good to excellent water quality conditions in all flowing streams. Water quality based on the sampling meets standards for aquatic life and primary drinking water indices for the following constituents: turbidity, dissolved oxygen, alkalinity (as CaCO3), pH, CO2 and total dissolved solids (USDI BLM 1978-2013). There is a historic dam on Green Creek which created Dynamo Pond.

Wilson Creek ditch originating near Conway Summit, receives water from Virginia Creek which was allocated to Conway Ranch in a water right granted in 1936. The Wilson Creek ditch is the only water diversion that is used to irrigate the Conway Ranch. Water in Wilson Creek and associated ditches and various springs on the Conway Ranch is slightly acidic (mean pH of 6.5) and of very low conductivity. Productivity of the streams and springs is considered low. Water temperature in Wilson Creek ranged from 50ºF to 60ºF in the summer of 1986 and is considered slightly cooler than preferred for some brown trout life history phases (Mono County Community Development Department Planning Division 2007).

In addition, the same streams were sampled for their aquatic insect fauna (typically larval life stages of insects) on a single occasion at the time of constituent sampling. Some types of aquatic insects are generally associated with good water quality. Species of insects within the Ephemeroptea, Plecoptera and Trichoptera orders are generally representative of this condition. Sampling of the mentioned streams found the highest number of aquatic insect species recorded occurred within these groups (USDI BLM 1978-2013).

For the Bodie Hills Project Area, the BIFO has on file approximately 200 recorded sites on springs and seeps (USDI BLM 1986b). However within a record, there may be more than one spring or seep associated with a site. Surveys for a majority of the sites date back to the 1980's with some reoccurring surveys documented to present. Water quality at these sites is often documented in the context of turbidity, eutrophication, soil disturbance, temperature, etc. Observed uses are also noted such as for stock water, power, mining, wildlife, etc. Water quality at some sites may not have been impacted and is only influenced by natural processes such as wildlife use and/or heavy rain events. However, some source impacts such as livestock use, mining, roads, camping, etc. may be noted. Some inventories may identify that a spring had undergone change to the physical, chemical, and or hydrologic processes.

For the project area, current water quality impacts are mainly due to low levels of livestock grazing, runoff from roads and highways, recreation, as well as small areas of housing subdivisions. These actions can all increase sediment and nutrients into water.

*Alternative 1: No Action*

*Direct and Indirect Effects*

There would be no direct effects to water quality because no programmatic vegetation restoration program will be implemented. There would likely be no effects to hydrology or geomorphology in the short-term. Riparian vegetation shades the water and acts to retard or prevent loose soil and sediment flow from entering the water during rainfall or snowmelt periods, and helps maintain strong root structures that anchor streambanks and promote deep, narrow channels with more stable water temperatures.

There may be indirect effects from not implementing vegetation restoration treatments. There will be ongoing fire management within the Bodie Hills project area to suppress fires to protect life and property. Fire suppression affects the natural process, for example a fire spreading naturally long distance until burning out due to lack of fuel. The lack of naturally occurring fire within an ecosystem may lead to increased fuel loads which can then lead to large scale uncontrollable wildfires. Large scale fires will affect water quality. Large, high burn severity fires can have the potential to reduce ground cover, and increase soil hydrophobicity and erosion enough to increase runoff post-fire. The removal of vegetation at a large scale will dramatically increase the sediment load. These high severity fires could also reduce soil productivity over the long-term. Depending on the timing and/or severity of the fire, and the state of the vegetation burned, there could be beneficial and/or undesirable effects. A beneficial outcome from a large scale fire would be burning in a mosaic pattern and consuming only native vegetation resulting in desired ecological systems returning to within their natural range of variability. An undesirable outcome from a large fire would be burning large acreages of riparian which may destabilize streambanks through removal of vegetation, and in some areas, creeks would likely either incise or have large inputs of sediment, which could alter channel location.

*Cumulative Effects*

The geographic scope of the cumulative effects analysis area encompasses the project area as well as the Mono Lake and East Walker River watersheds where there is a potential for other actions to affect water quality in the entire watershed. Past, present, and potential future actions within the project area that have or could affect water quality include fire; fire suppression; mining; livestock grazing; dams, reservoirs, and water diversions; paved roads, unpaved roads, and parking lot development; recreation; vegetation management projects; and residential and commercial development. Current conditions in the project area result from a multitude of natural events and human actions that have taken place over many decades. These identified actions all cause or have caused some form of soil disturbance, and vegetation disturbance or loss in the footprint of the activity. Therefore, these actions have and may continue to negatively affect water quality (see the background section above for details).

There are very few specific reasonably foreseeable actions for which there is a decision to implement that will impact water quality. There are several recent and pending decisions

regarding grazing in the Bodie Hills, but they have been litigated and the outcome is unknown (see cumulative effects analysis for Issue 1). Similarly, discussions of potential mining activity are not reasonably foreseeable because no proposal has been submitted to the BLM (see cumulative effects analysis for Issue 1). The only other known actions that will cumulatively affect water quality are vegetation restoration projects that are occurring or are planned on private lands within the cumulative effects analysis area. Several private landowners are implementing treatments similar to this proposal on their lands as well as other treatments in meadows and riparian areas. These projects will likely have a small temporary effect on water quality through increased sediment delivery to streams but over the long term will have a positive effect by improving riparian health and filtration.

Together with this proposal the cumulative effects of the past, present and reasonably foreseeable actions will be a continuation of the current conditions as documented in the background section with a potential for a large increase in sediment and nutrient delivery to streams if wildfire severity and frequency increases.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

There would be minor direct and indirect effects to water quality with implementation of the Proposed Action. Associated riparian treatments within montane riparian, stable aspen, and wet meadows would only account for approximately 3% of the total maximum acres of vegetation treatment across all ecological systems for the proposed 10 year outlook. Negative direct effects include the removal of vegetation and soil disturbance. Negative indirect effects include the persistence of bare soil that may be susceptible to erosion. However, design features will be used to minimize negative effects of the treatments on resources. Design features will also be used to meet Timber Waiver Category 2 of the California Regional Water Quality Control Board Lahontan Region.

The vegetation types targeted for treatment are primarily the upland types that were found to be at the greatest departure from their natural range of variability and at the greatest risk of conversion to uncharacteristic classes. The treatments in riparian systems that are included are only those that will also be used in adjacent or surrounding uplands and can be applied continuously across both ecological systems.

The Proposed Action should only have minor and short term negative effects to water quality and soils (with implementation of the design features) due to the minor ground disturbance. This minor ground disturbance, including prescribed fire, removing and/or thinning increasing pinyon and juniper, pile burning, establishing fuel breaks along existing roads, and restoration of depleted sagebrush through mowing could slightly increase soil compaction, soil disturbance, and runoff, but at such a low level that the effects would be immeasurably small.

Sediment loading is the most likely potential water pollutant and can be produced through various avenues. Equipment, vehicles, or hand tools can dislodge soil directly. When it rains, dislodged soil can be washed into surface water. Further, removal of vegetation and soil cover, from mechanical removal or broadcast or pile burning can expose bare soil and allow for rain and runoff to move the soil into water.

Where prescribed fire is used in most cases the fire will be contained using low impact techniques during seasons when the risk of spread is very low. It is possible that, where necessary, hand lines may be constructed to contain the fire. Under the design features incorporated into all the alternatives, hand lines will be recontoured or waterbarred where there is a risk of erosion. This should ensure that fire lines do not increase soil erosion. The burning of piles may lead to patches of bare soil as the heat from the fire could temporarily sterilize the soil surface. Vegetation is likely to recolonize within three growing seasons.

Water temperature may increase with fuels reduction projects because shade trees in riparian areas are possibly removed, increasing solar heating of the water. In this project, there is very little potential for increased water temperature. The treatment units are relatively small, and do not contain long stream segments. Removal of some smaller diameter trees along a few hundred feet of stream channel should not affect water temperature.

Existing roads within the project area will be used for project work, but the work should not alter their level of compaction or erosion because the roads are already disturbed, compacted, and devoid of vegetation. No new roads would be created during this project. However, there could be some minor, local and temporary soil displacement with general off-road travel by mechanized equipment, and therefore soil displacement and compaction should be local and very minor. This disturbance may have local negative effects to water quality with potential for runoff, but these effects should be short-term.

While large, high burn severity fires can have the potential to increase soil hydrophobicity and reduce ground cover enough to increase runoff post-fire, any prescription burn should not have that affect.

Without implementation of this project, the area would become more susceptible to a large scale wildfire than if the project was implemented (see Issue 5). Large scale fires will affect the water quality. Large, high burn severity fires can have the potential to reduce ground cover, and increase soil hydrophobicity and erosion enough to increase runoff post-fire. The removal of vegetation at a large scale will dramatically increase the sediment load. These high severity fires could also reduce soil productivity over the long-term.

*Cumulative Effects*

There are historic mining sites, livestock grazing, dams, reservoirs, water diversions, roads, parking lots, and residential and commercial developments within the project area, all of which cause or have caused some form of soil disturbance, and vegetation disturbance or loss in the footprint of the activity (see the background section for detailed discussion of the water quality impacts of these activities). The Proposed Action would add another small layer of disturbance. However, because the direct and indirect effects of the Proposed Action are minor, local, and short-term, the cumulative effects should also be minor, local, and short-term.

Over the long term, the Proposed Action would reduce the risk of a catastrophic wildfire, decreasing the risk of soil degradation from loss of vegetation cover, water repellency, and off-site erosion and stream sedimentation that could affect the watershed process. This would greatly

reduce the potential cumulative effects of all the past and current activities in combination with the effects of the ecological departure and fire regime in comparison with the No Action Alternative.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The Increased Acreage Alternative is similar to the Proposed Action with some targets for acres of treatment increased. The Increased Acreage Alternative increases the total amount of treatment by 40% of the Proposed Action (23,880 acres). However, associated riparian treatments within montane riparian, stable aspen, and wet meadows would only account for approximately 3% of the total maximum acres of vegetation treatment across all ecological systems for the proposed 10 year outlook. The effects of the increase acreage alternative will be the same as the Proposed Action. There would be a slight increase of direct and indirect effects at the project scale as compared to the Proposed Action. However, the negative effects will be localized, minor and short term as described above in the Proposed Action. This alternative's beneficial effects will increase acreage to maintain and restore the natural range of variability and further reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the Increased Acreage Alternative are similar to the Proposed Action therefore the cumulative effects are expected to also be similar. See the cumulative effects analysis for the Proposed Action above. The beneficial effects of preventing large scale severe wildfire would be greater so the overall reduction in negative impacts to water quality compared to the No Action Alternative would also be greater.

*Alternatives 4, 5 and 6: Reduced Acreage Alternatives*

*Direct and Indirect Effects*

All the reduced acreage alternatives are similar in their effects on water quality. Alternatives 4, 5 and 6 lower the total amount of treatment to 61% (10,268 acres), 76% (12,903 acres), and 67% (11,288 acres) of the Proposed Action respectively. Associated riparian treatments within montane riparian, stable aspen, and wet meadows would only account for approximately 3% of the total maximum acres of vegetation treatment across all ecological systems for the proposed 10 year outlook. Methods and design criteria are the same as the Proposed Action. The effects of the reduced acreage alternatives will be the same as the Proposed Action. There would be a slight decrease of negative direct and indirect effects at the watershed scale as compared to the Proposed Action. As with the Proposed Action, the negative effects will be localized, minor and short term. These alternatives will not be as beneficial as the Proposed Action because of the decrease in acres treated to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the reduced acreage alternatives are similar to the Proposed Action. These alternatives may have decreased adverse effects due to the decreased acres of treated vegetation as compared to the Proposed Action. However, they also do not as effectively

decrease the potential of having a catastrophic event, like a wildfire therefore the beneficial effects are also smaller. See the cumulative effects analysis for the Proposed Action above.

## Wetlands and Riparian Zones

Effects to vegetation, soil, water quality, and watersheds are important and components of wetlands and riparian zones. Those effects are analyzed in Issues 1, 6, 7, 8, 10, 15 and the Water Quality section within this document. The streams and springs in the project area are listed in the Water Quality section above.

*Background*

For the Bodie Hills proper or the east side of Highway 395 within the project area, riparian soils are generally derived from alluvium from mixed rock sources and volcanic ash and are highly stratified with textures ranging from very cobbly sand to clay. Typical soil profiles range from gray loam at 0-30cm (0-12 in.) to dark gray silt loam at 139.7-152.4cm (55-60 in.). Permeability is slow to moderately rapid and available water capacity is moderate to high (12-24cm) (5.0-9.5 in.). Depth to water ranges between 0-45cm (0-17.73 in.) in March through May. Potential plant rooting depth is 152.4+cm (60+ in.) (USDA NRCS 1996). The National Resources Conservation Service (1996) also classifies the hazard of erosion by wind and water as slight.

The majority of stream reaches range from moderate to high gradient systems that are characterized by a mosaic of willow dominated and wet meadow graminoid community types. A large percentage of these systems occur on private lands. Perennial streams tend to support a thin strip of riparian vegetation, mainly woody vegetation with a smaller herbaceous component. Riparian areas range in width from approximately a foot to over 10 feet. Aspen and willow are the dominant woody overstory species. Deeply rooted grasses, sedges, and rushes and diverse forb species comprise the understory.

The streambank vegetation along reaches where livestock grazing is effectively managed or controlled is structurally and compositionally varied, providing important wildlife habitat components and ecologically important reference sites. Riparian communities are represented by several seral stages. The BLM-TNC evaluation of the seral conditions of riparian and wetland communities in the Bodie Hills indicated that seral conditions for riparian and wetland systems in the Bodie Hills are within the range of natural variability.

Proper Functioning Condition (PFC) has been assessed for some of the riparian reaches within the project area (USDI BLM 1978-2013). Proper Functioning Condition is a state of resiliency that allows a riparian area to hold together during high-flow events with a high degree of reliability. The reach may be functional even though it has not attained its ecological potential or optimal conditions for a given species. PFC assessments are based on hydrologic, vegetative and soil erosion criteria (USDI BLM 1998a, USDI BLM 1998b). Stream assessments were performed to determine Proper Functioning Condition and at time of assessments, many streams were functioning-at-risk for a variety of reasons including historic mining and grazing, and influences by roadways adjacent to streams (USDI BLM 1978-2013).

Further information on riparian condition and trends is available from stream inventories conducted in 1978-79 to ascertain overall stream condition in terms of fish habitat (USDI BLM

1978-2013), and extensive and intensive stream monitoring conducted originally in 1988 and repeated once or more in subsequent years for stream reaches potentially undergoing change (USDI BLM 1978-2013). Inventory data show that riparian condition remained relatively static between 1978 and 1998. Since that time, cursory evaluation on most stream reaches indicate that overall riparian condition trend is improving with improved vegetation expression being the primary attribute showing improvement. Measureable improvements in both vegetation cover and bank stability have occurred on stream segments where riparian pasture or exclosure fencing has been used to control cattle use.

For the west side of Highway 395 within the project area, in general, streams occur primarily in alluvium derived from a granitic source. Streams tend to be well armored with rocks and characterized by a mosaic of willow or aspen and graminoid vegetation community types. Riparian areas are commonly narrow in width; aspen and willow dominate the woody over-story, deeply rooted grasses, sedges, rushes and forb species make up the under story.

Unimproved dirt road crossings occur along Virginia and Dog Creeks. Crossing locations have generally caused a break-down of stream bank integrity, widening of the channel for 10 to 20 ft up and downstream of the crossing, creation of shallow pools, and contribution of a minor amounts of suspended sediment into the downstream channel. Dog Creek was heavily impacted by mining activities around the 1850's. Dredging of the creek removed sinuosity of the channel which has had lasting impacts including limiting the extent of the riparian zone. Dog Creek is generally undergoing improved riparian vegetation condition.

An assessment of the functional condition for each stream was completed in 1993 using the protocol in the BLM Technical Reference 1737-9. Based on the assessment of each stream for its functional capability within the hydrologic, vegetative, and erosion deposition categories, all streams were classified as "functioning-at-risk." Meaning that the streams are in functional condition given their capability and potential for their physical setting, but existing soil, water, or vegetation attributes makes them susceptible to degradation. While no formal re-evaluation has occurred since 1993, based on recent knowledge, Dog Creek, Green Creek, Dunderberg Creek and Virginia Creek are still considered to be functioning-at-risk with an upward trend toward proper functioning condition throughout their entirety or in substantial segments (USDI BLM 1978-2013).

Throughout the project area spring surveys for a majority of the sites date back to the 1980's with some reoccurring surveys documented to present. Observed uses are noted such as for stock water, power, mining, wildlife, etc. Some inventories may identify that a spring had undergone change to the physical, chemical, and or hydrologic processes.

Mesic graminoid meadows are generally wet to moist well into the growing season. Dominant species in the mesic graminoid meadow include, but are not limited to: *Carex nebrascensis, Carex simulata, Carex lanuginosa, Carex utriculata, Deschampsia cespitosa, Hordeum brachyantherum, Muhlenbergia filiformis, Epilobium ciliatum, Stellaria longipes* var. *longipes* and *Aster occidentalis*. Willow stands can border these communities and include such species as, *Salix geyeriana*, *S. lemmonii*, *S. lutea* and *Salix exigua*. There are no extensive wetlands in the project area. Many small wetland areas center on springs, seeps, and ephemeral lakes. Many of

these sites occur on private lands.

*Alternative 1: No Action*

*Direct and Indirect Effects*

There would be no direct effects to wetlands and riparian zones because no programmatic vegetation restoration program will be implemented. There would likely be no effects to hydrology or geomorphology.

There may be indirect effects from not implementing vegetation restoration treatments. There will be ongoing fire management within the Bodie Hills project area to suppress fires to protect life and property. The lack of naturally occurring fire within an ecosystem may lead to increased fuel loads which can then lead to large scale uncontrollable wildfires. Large scale fires will affect the watershed processes. Large, high burn severity fires can have the potential to reduce ground cover, and increase soil hydrophobicity and erosion enough to increase runoff post-fire. The removal of vegetation at a large scale will dramatically increase the sediment load. These high severity fires could also reduce soil productivity over the long-term. Depending on the timing and/or severity of the fire, and the state of the vegetation burned, there could be beneficial and/or undesirable effects. A beneficial outcome from a large scale fire would be burning in a mosaic pattern and consuming only native vegetation resulting in desired ecological systems returning to within their natural range of variability. An undesirable outcome from a large fire would be if the fire burned large expanses of riparian areas, streambanks would be destabilized through removal of vegetation, water flow could increase, and in some areas, creeks would likely either incise or have large inputs of sediment, which could alter channel location.

*Cumulative Effects*

The geographic scope of the cumulative effects analysis area encompasses the project area but also includes the Mono Lake and East Walker River watersheds. The other actions that may affect wetlands and riparian zones are the same as those that affect water quality so the cumulative effects are the same as discussed in the Water Quality Section above. Past and current actions have led to some degradation of riparian conditions as documented above in the background section. Cumulatively the combination of No Action for this project would be to maintain the current upward trend in riparian conditions with the potential for negative impacts over the long term from severe wildfires. Severe wildfires may have an adverse effect cumulatively to wetlands and riparian zones eventually reversing the current overall upward trend.

*Alternative 2: Proposed Action*

*Direct and Indirect Effects*

The direct and indirect effects to wetlands and riparian zones are very similar to the effects to Water Quality discussed above. There would be short term minor effects to water quality due to sediment and nutrients but this is not expected to be large enough to affect the function, vegetation, or aquatic organisms typical of these systems. Some vegetation would be removed but would facilitate regrowth of native species beneficial to riparian function. The encroachment of upland species into riparian vegetation would be reversed in some locations.

The Proposed Action may have very minor, local adverse effects to stream morphology, but they should be small and localized. Streamside buffers will be used so that no mechanical equipment is used near streams. Prescribed fire will not be actively ignited in the water body buffer zone but can be allowed to move into it passively. No piles will be constructed on the floodplain or within 25 feet of the stream channel (see the Design Criteria for the Proposed Action). The few areas of wetland and/or riparian zones that could have some very slight disturbance due to this project will have no effect on overall stream function or hydrology.

The Proposed Action may reduce the risk of increasingly severe and frequent wildfires occurring in the project area. This has the potential to have a beneficial effect on the functioning of riparian and wetland systems compared to the No Action Alternative. See the Water Quality analysis above.

*Cumulative Effects*

There are historic mining sites, livestock grazing, dams, reservoirs, water diversions, roads, parking lots, and residential and commercial developments within the project area, all of which cause or have caused some form of soil disturbance, and vegetation disturbance or loss in the footprint of the activity. The Proposed Action would add another small layer of disturbance. However, because the direct and indirect effects of the Proposed Action at the project scale are minor, local, and short-term, the cumulative effects should also be minor, local, and short-term. They will not have any measurable effects when added to other disturbance in the project area.

The Proposed Action would reduce the risk of a catastrophic wildfire, decreasing the risk of soil degradation from loss of vegetation cover, water repellency, and off-site erosion and stream sedimentation that could affect wetlands and riparian zones. This would have an overall beneficial cumulative effect on the wetlands and riparian zones of the area in combination with the current slow upward trend resulting from all the other activities in the area.

*Alternative 3: Increased Acreage*

*Direct and Indirect Effects*

The Increased Acreage Alternative is similar to the Proposed Action with some targets for acres of treatment increased. The increased acreage alternative increases the total amount of treatment by 40% of the Proposed Action (23,880 acres). However, associated riparian treatments within montane riparian, stable aspen, and wet meadows would only account for approximately 3% of the total maximum acres of vegetation treatment across all ecological systems for the proposed 10 year outlook. The effects of the Increased Acreage Alternative will be similar to the Proposed Action. There would be a slight increase of direct and indirect effects to wetlands and riparian zones as compared to the Proposed Action. However, the negative effects will be localized, minor and short term as described above in the Proposed Action. This alternative's beneficial effects will increase the program's ability to maintain and restore the natural range of variability and further reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the Increased Acreage Alternative are similar to the Proposed Action. This alternative may have increased adverse effects due to the increased acreage of vegetation

treatments as compared to the Proposed Action. However, the benefit of treating more acres may decrease the potential of having a catastrophic event, like a wildfire resulting in a net cumulative benefit to the riparian and wetland systems of the area in combination with their current upward trend.

*Alternatives 4, 5 and 6: Reduced Acreage Alternatives*

*Direct and Indirect Effects*

All the reduced acreage alternatives have essentially the same effects on wetlands and riparian areas. Alternatives 4, 5 and 6 each lower the total amount of treatment to 61% (10,268 acres), 76% (12,903 acres), and 67% (11,288 acres) of the Proposed Action respectively. Associated riparian treatments within montane riparian, stable aspen, and wet meadows would only account for approximately 3% of the total maximum acres of vegetation treatment across all ecological systems for the proposed 10 year outlook. Methods and design criteria are the same as the Proposed Action. The effects of the reduced acreage alternatives would be the same as the Proposed Action. There would be a slight decrease of negative direct and indirect effects to wetlands and riparian zones as compared to the Proposed Action. As with the Proposed Action, the negative effects will be localized, minor and short term. These alternatives would not be as beneficial as the Proposed Action because of the decrease in acres treated to maintain and restore the natural range of variability and reduce the risk to nearby communities and the historic resources in Bodie State Park from severe wildfire.

*Cumulative Effects*

The cumulative effects of the reduced acreage alternatives are similar to the Proposed Action. These alternatives may have decreased adverse effects due to the decreased acres of treated vegetation as compared to the Proposed Action. However, the beneficial effects of decreasing the potential of having a catastrophic event, like a wildfire will also be decreased.

## Wild and Scenic Rivers

*Background*

There are no designated Wild and Scenic River segments within the project area. Rough Creek, Atastra Creek, Virginia Creek, Dog Creek, and Green Creek, located entirely within the project area, are identified as eligible for study for inclusion in the Wild and Scenic River System in the August 1991 Final Bishop Resource Management Plan (RMP) Environmental Impact Statement (EIS) (USDI BLM 1991). Suitability studies have not been completed for any of those segments. The segments include the shoreline and adjacent land within ¼ mile of the rivers. Rough Creek has the potential classification of Wild, Atastra Creek the potential classification of Scenic/Recreational, and Virginia Creek, Green Creek and Dog Creek each have the potential classification of Recreational.

BLM policy for management of river segments that are being studied for inclusion in the Wild and Scenic Rivers System is described in BLM Manual 6400 – Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management (USDI BLM 2012f). The manual guidance is provided to fulfill obligations contained in the Wild and Scenic Rivers Act of 1968.The BLM's policy goal for eligible rivers is to manage their free-flowing condition, water quality, tentative classification, and any outstandingly remarkable values to assure a decision on suitability can be made (BLM Manual 6400 3.5) (USDI BLM 2012f).

If the eligibility assessment was completed today and the criteria described in the current BLM Manual 6400 were utilized, the fish and wildlife values would be described as fish values (habitat) and wildlife values (both populations and habitat) (USDI BLM 2012f). Detailed descriptions of the outstandingly remarkable values identified in the eligibility assessments for the five river segments are included in Appendix 2 of the Draft Bishop RMP and EIS, September 1990 (USDI BLM 1990b). All five segments were identified as possessing fish and wildlife values. The biological diversity of plant and animal species and habitats were described as a value for each of the five eligible river segments. Rough Creek and Atastra Creek were identified as possessing the high capability of supporting federally threatened Lahontan cutthroat trout. They were also identified as having high quality populations of rainbow trout. Virginia Creek, Green Creek and Dog Creek are recognized for their brown trout populations and the recreational use opportunity they provide. Virginia Creek and Dog Creek were identified as having historical value because of the location of the region's first mining settlement (Dog Town) and the associated historic resources. Virginia Creek additionally has scenic and recreational values.

Several changes have occurred since the original eligibility assessment was completed. Greater sage-grouse was not a proposed threatened species for Federal listing at that time, however it is today and the five river corridors within the project area are within habitat for the species. Guidance in Manual 6400 acknowledges that populations of Federal or state listed or candidate, threatened, endangered or BLM sensitive species are of particular significance as wildlife values (BLM Manual 6400 3.E.5). Rainbow trout and brown trout populations in those river segments that were identified as outstandingly remarkable values in the original eligibility assessments may represent a recreational value, however because they are not indigenous to the region those fish populations would not be an example of a fish value.

*Alternative 1: No Action*

*Direct and Indirect Effects*

There would be no direct effects on the outstandingly remarkable values identified in the eligibility assessment. There would potentially be indirect effects on those river segments in the event that an unplanned catastrophic wildfire occurs in any of those areas; if vegetation converts to less desirable species, such as non-native annual grasses; or if vegetation continues to progress to conditions outside the normal range of variability.

Scenic

The Virginia Creek area would retain its scenic aesthetic if no restoration action is taken. The reduction in risk of unplanned catastrophic wildfire would not occur and there would continue to be a possibility of dramatic visual effects (see Issue 19) as a result of the greater risk of high severity wildfire in the area. High severity fires outside the nature fire regime would result in a slower recovery of vegetation (see the analysis in Issue 5 and the Wetlands and Riparian Section above). The scenery would be affected by a lack of vegetation for a longer period of time. If low to moderate intensity wildfire occurred in the area, scenic values would be affected by the loss of vegetation; however plant growth would make the effect much less apparent after 1-3 years.

Recreational
The types of recreational activities would be the same. Unplanned wildfire in the area could displace visitors and make the area less desirable for camping. If the area experienced high severity fire, it would have a large impact on the quality of recreational experience in the area because the desirability of camping would be diminished and riparian habitat for fish and the associated fishing opportunities would potentially be harmed.

Fish and Wildlife
The five eligible segments possess important plant and animal diversity. Some of the vegetation in these segments would continue to be at an increased risk of conversion to less desirable species and continue to exist in a departed state. Removal of riparian vegetation in a severe fire could result in short-term increased water temperature and a temporary decrease in vegetative diversity (see the Wetlands and Riparian Section). The direct and indirect effects of the project on wildlife that utilize upland terrestrial, riparian and aquatic habitats are described in Issue 12. Direct and indirect effects on wetlands and riparian vegetation are analyzed in the section above. The potential habitat for Lahontan Cutthroat in Rough Creek and Atastra Creek is discussed in the threatened and endangered species section.

Historical
The Dog Town area, the first mining settlement in the eastern Sierra, contains many protected historic resources. Those historic resources will continue to be protected if there is no prescribed fire or there are no vegetation treatments in the area. High severity wildfire in the area would put certain types of historic resources at increased risk. The potential impact to historic resources in the event of unplanned fire and during fire suppression is discussed in cultural and historic resources analysis.

*Cumulative Effects*
There are no other past, present, or reasonably foreseeable actions that will affect the eligible wild and scenic stream reaches in the Project Area because BLM policy direction is to protect the free flowing condition and outstandingly remarkable values until Congress takes action to designate or release each segment. There are no cumulative effects.

*Alternative 2: Proposed Action*
*Direct and Indirect Effects*
If the Proposed Action were implemented there would be temporary minor direct and indirect effects on the outstandingly remarkable values of the five eligible creeks, but their free-flowing condition will not be altered and over the long term their outstandingly remarkable values will be protected. Some of the segments may receive treatments; others may not. A very minor amount of vegetation would be removed in each watershed and it may or may not occur or within ¼ mile corridor above the river shoreline in those segments. Only 30 acres of riparian treatments will be done across the entire landscape which is 0.2% of the total project acres.

Nothing in the Proposed Action would affect the free flowing condition of the five eligible creeks; no structures will be constructed for the project. A range of vegetation management actions that are designed to protect, restore or enhance the river environment is considered appropriate for eligible Scenic and Recreational segments in BLM policy (BLM Manual 6400

3.6.G.2). Design features would be utilized in those corridors and will help protect their values including soils and hydrology design features that protect the riparian zone and streambanks from impacts. Design features for treatments in WSAs apply to the portions of the Rough Creek and Atastra Creek segments located within the Bodie WSA. Within the reach of Rough Creek found to be eligible for wild designation no tree cutting will be used, but prescribed burning is allowed.

Scenic
Any treatment in the Virginia Creek corridor may have a temporary impact on the aesthetics of the area. The effects would be more apparent during and immediately after treatment, but it would diminish over time. The effects of the treatments on visual resources are discussed in Issue 19.

Recreational
There may be a temporary effect on recreational opportunities for fishing and camping in Virginia Creek if the area receives treatment. When prescribed fire or other treatments are being implemented there could be area closures in the interest of safety that would temporarily reduce access.

Fish and Wildlife
Effects would be less than those of an unplanned, severe stand-replacing fire and the chance of one occurring in the project area would be reduced with the treatment. In eligible corridors where restoration treatments are implemented, there will be minor short-term impacts to fish, wildlife, and vegetation, however there would be less potential for negative effects on plant and animal species than if the project were not implemented. More specific analyses on the effects of the Proposed Action on wildlife are included in Issues 12-14, and topical relevant analyses are included in the following sections: Threatened and Endangered Species (Lahontan Cutthroat), Water Quality and Wetlands and Riparian Zones.

Historical
Historic resources in the Dog Town area of Virginia Creek and Dog Creek and elsewhere within Wild and Scenic eligible corridors would be protected utilizing the design features for cultural resources. The effects of the Proposed Action on historic resources are described in the Cultural and Historic Resources analysis above.

*Cumulative Effects*
There are no other past, present, or reasonably foreseeable actions that will affect the eligible wild and scenic stream reaches in the Project Area because BLM policy direction is to protect the free flowing condition and outstandingly remarkable values until Congress takes action to designate or release each segment. There are no cumulative effects.

*Alternative 3: Increased Acreage*
*Direct and Indirect Effects*
The direct and indirect effects to the Wild and Scenic River values described in the Proposed Action are essentially the same for the Increased Acreage Alternative. Methods and design criteria are the same as the Proposed Action. If areas of Low Sagebrush, Mountain Sagebrush

Steppe and Wyoming Big Sagebrush- Loamy within Wild and Scenic eligible river corridors receive more treatment, there would be an increased benefit to fish and wildlife values in those areas because more vegetation would receive treatment and more area would be restored to a natural range of variability. There would also be short-term impacts immediately during and after treatment.

*Cumulative Effects*
See the analysis for the Proposed Action.

*Alternative 4: Reduced Acreage – Treatment in CWPP WUI Only*
*Direct and Indirect Effects*
Because the Wild and Scenic eligible segments of Rough Creek and Atastra Creek are located outside of the CWPP WUI they would not be included in the project if this alternative is implemented. The effects to fish and wildlife values in those two segments would essentially be the same as the No Action Alternative. The effects to Virginia Creek, Green Creek and Dog Creek would be similar to the Proposed Action.

*Cumulative Effects*
See the analysis for the Proposed Action.

*Alternative 5: Limited Treatment in WSAs*
*Direct and Indirect Effects*
In this alternative, the effects to Virginia Creek, Dog Creek, Green Creek, and Rough Creek would be the same as the Proposed Action. Atastra Creek, located within the Bodie WSA, would not be eligible to receive treatments other than broadcast burning. Rough Creek, also in the Bodie WSA, will only receive broadcast burning treatments in all action alternatives to be consistent with BLM policy (Manual 6400) so the effects are the same as the Proposed Action. For Atastra Creek, there could be an effect on fish and wildlife values and wildlife habitat because there would be a more limited set of treatment options. The short-term impact during vegetation treatments may be reduced, but the longer-term habitat benefit would potentially not be achieved. Refer to the references to analyses for resources described in Alternative 4.

*Cumulative Effects*
See the analysis for the Proposed Action.

*Alternative 6. No Treatment in WSA*
*Direct and Indirect Effects*
The effects to Rough Creek and Atastra Creek would be the same as the No Action Alternative. The effects to Virginia Creek, Dog Creek and Green Creek would be similar to the Proposed Action.

*Cumulative Effects*
See the analysis for the Proposed Action.

## Wilderness

There are no designated wilderness areas in the project area but there are three Wilderness Study

Areas (WSAs) and units that were found to have Wilderness Characteristics in a recent inventory update. Several of the issues analyzed above address effects to the wilderness resource in these areas. Effects to the WSAs and their eligibility for designation as wilderness are analyzed in Issue 24. Effects to wilderness character outside of WSAs are analyzed in Issue 21. Effects to visual resources are analyzed in Issue 18.

# CHAPTER 4: CONSULTATION AND COORDINATION

## Consultation

The Bishop Field Office has consulted with Tribes of the Eastern Sierra regarding the Proposed Action since the beginning of project development. There have been multiple opportunities for Tribes to raise concerns regarding any potential for effects to their cultural values including multiple field trips to the project site. These field trips included visits to sites treated with the same methods as proposed here to demonstrate the potential effects. The Field Office has incorporated the feedback received in consultation and does not believe that there will be negative impacts to Native American Cultural Values. See also the analysis of effects to Cultural and Historic Resources, above.

The Bishop Field Office initiated informal conferencing with regard to the Bi-State DPS of greater sage-grouse in a memo dated September 4, 2014 (USDI BLM 2014b). Prior to that the BLM had several informal discussions and field visits with the Fish and Wildlife Service (FWS) regarding the proposed treatments described in the Environmental Assessment (EA) over the last several years. These conversations included discussions of the proposed treatments and the process for informal conferencing. As the EA moved toward completion, additional meetings and phone calls regarding the proposed treatments occurred (December 4, 2013, February 24, and 27, March 4 and 20 of 2014). After FWS review of the Bishop Field Offices' informal conferencing memo (USDI BLM 2014b) and associated Conference Assessment (CA) (USDI BLM 2014a), additional conversations occurred through email and phone calls in October and November of 2014.

The FWS responded to informal conferencing memo with a Conference Report on November 26, 2014 (USDI FWS 2014). The FWS stated "We support the BLM's plan to conduct habitat improvement projects within the Bodie Hills identified in the CA. The proposed action is designed to reduce sage-grouse impacts from any detectable or measurable disturbance by restricting the type, location, scale and timing of treatments. Secondly, adverse effects to proposed critical habitat are expected to be limited based on various adaptive management strategies detailed within the CA. Overall, the purpose of the Bodie Hills Upland Vegetation Restoration Project is to improve habitat conditions to benefit the sagebrush community and specifically manage for sage-grouse habitat improvements and reduce threats such as wildfire(s)."

The FWS made 3 recommendations, summarized here:

1) "We recommend evaluating alternative management scenarios to address the long term sustainability of the meadows within the Bodie Hills and return them to proper functioning condition. The Service requests that the BLM reinitiate conferencing when further evaluating meadow restoration objectives."
2) "The Service recommends further consideration of treatment of annuals in areas where present and is not responsive to outlined adaptive strategies…. If the use of herbicides is deemed necessary at a later date, the Service requests that the BLM reinitiate conferencing."
3) "We encourage the BLM to consider monitoring for at least the first three years after mowing treatments and at 3-5 year intervals thereafter to evaluate success of the

> treatments and ensure what invasive species are not establishing within the treatment area."

The Bishop Field Office will continue to work with the FWS with regard to these recommendations. It is expected that the FWS will publish a proposed rule with a determination of the federal status under the ESA for the Bi-State DPS in April 2015. The Bishop Field Office will initiate the appropriate level of conference or consultation with the FWS, based on the status of the DPS, in accordance with legal and policy requirements.

The Bishop Field Office has also been in ongoing consultation with the California Department of Fish & Wildlife regarding this project. Implementation of the sage-grouse habitat improvement projects in the Bodie PMU is consistent with the Provencher, Low et al. 2009 Bodie Hills Conservation Action Plan are identified as a conservation action in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a). The plan was signed by the FWS and both the California Department of Fish & Wildlife and the Nevada Department of Wildlife.

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**Date:** January 20, 2015

**Reviewed by:** ***/s/ Dale Johnson*** **Date: 1/22/2015**
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# APPENDICES

## A. Glossary and List of Acronyms

**ACEC:** Area of Critical Environmental Concern.
**BIFO:** Bureau of Land Management Bishop Field Office.
**BLM:** United States Department of the Interior Bureau of Land Management. See also USDI BLM.
**CA-IPC**: California Invasive Plant Council.
**CalEPA ARB:** California Environmental Protection Agency Air Resources Board.
**CDFG:** California Department of Fish and Game (Now California Department of Fish and Wildlife). See also CDFW.
**CDFW:** California Department of Fish and Wildlife (Was California Department of Fish and Game). See CDFG.
**Desired Plant Community (DPC):** A vegetation association as defined in the Bishop RMP with associated goals for management (USDI BLM 1993a).
**EA:** Environmental Assessment (NEPA document).
**Ecological Departure**: The departure of vegetation states from the Natural Range of Variability (See Natural Range of Variability).
**Ecological resilience**: Properties of an ecosystem that allow it to withstand disturbance without changes in processes and structures occurring that are of sufficient magnitude to result in new alternative states.
**Ecological system**: Recurring groups of biological communities that are found in similar physical environments and are influenced by similar dynamic ecological processes, such as fire or flooding. They are intended to provide a classification unit that is readily mappable, often from remote imagery, and readily identifiable by conservation and resource managers in the field (NatureServe).
**FLPMA:** Federal Land Policy and Management Act of 1976
**FRCC:** Fire Regime Condition Class. A metric for describing ecological departure that is the percentage departure from the modeled distribution of seral classes under the natural range of variability.
**FWS:** United States Department of the Interior Fish and Wildlife Service. See also USDI FWS.
**GBBO**: Great Basin Bird Observatory.
**GBUAPCD:** Great Basin Unified Air Pollution Control District.
**GIS:** Geographic Information System.
**Go-No-Go Checklist:** Prescribed fire Burn Boss checklist to identify all agency contacts, and to ensure that resource concerns and objectives are addressed prior to ignition.
**Invasive plants**: Non-native plants whose introduction does or is likely to cause economic or environmental harm or harm to human health. (Based on the definition provided in Executive Order 131121). Non-native annual grasses such as cheatgrass (*Bromus tectorum*) or red brome (*Bromus madritensis*) are also included in this definition.
**IPCC:** Intergovernmental Panel on Climate Change.
**Key Observation Point (KOP):** A viewpoint from which observers are likely to view the project or treatment which is used in analysis of potential visual impacts.
**Management Area (MA):** A planning unit defined in the Bishop Resource Management Plan.

**MIST:** Minimum impact suppression techniques for controlling fire used in sensitive areas such as WSAs.
**Natural Range of Variability (NRV)**: The variation of vegetation states across the landscape due to the natural biotic or abiotic processes without intervention from industrial societies.
**NDEP DWQP:** Nevada Division of Environmental Protection Bureau of Water Quality Planning.
**NDOW:** Nevada Department of Wildlife.
**NEPA**: National Environmental Policy Act.
**Non-native plants:** Refers to plants introduced to North America or more specifically the Great Basin region from other parts of the world or from a different geographic region. Non-native plants are not necessarily an invasive plant.
**NRCS:** United States Department of Agriculture Natural Resource Conservation Service. See also USDA NRCS.
**NRV**: Natural Range of Variability.
**RMP:** Resource Management Plan. Used in reference to the Bishop RMP (USDI BLM 1993a).
**Seral class or stage**: The series of plant communities that develop during ecological succession.
**Surface disturbance:** In reference to management of WSAs, surface disturbance is defined as new disruption of the rock, soil, or vegetation, including vegetative trampling, that would necessitate reclamation, rehabilitation, or restoration in order for the site to appear and function as it did prior to the disturbance (BLM Manual 6330 1.6.C).
**TNC**: The Nature Conservancy.
**Uncharacteristic vegetation state:** A vegetation condition that would not have occurred under natural conditions such as invasion by nan-native plants or vegetation resulting from an altered or missing disturbance regime.
**USDA NRCS:** United States Department of Agriculture Natural Resource Conservation Service. See also FWS.
**USDI BLM:** United States Department of the Interior Bureau of Land Management. See also BLM.
**USDI FWS:** United States Department of the Interior Fish and Wildlife Service. See also FWS.
**USDI USGS:** United States Department of the Interior United States Geological Survey. See also USGS.
**USDI USGS WERC:** United States Department of the Interior United States Geological Survery Western Ecological Reseach Center.
**USGS:** United States Geological Survey.
**VDDT:** Vegetation Dynamics Development Tool. A computer program for modeling the change over time of seral classes. Used to calculate FRCC under different scenarios. See Provencher, Low et al. 2009.
**VRM Class:** (Visual Resource Management Class) Standards defined in the Bishop Resource Management Plan for maintenance of visual resources.
**WNv:** West Nile Virus.
**WSA**: Wilderness Study Area.
**WSR:** California Statewide Wilderness Study Report, 1990, Part 4, Volume One.

## B. Ecological System Descriptions

Definitions of the vegetation classes for the target ecological systems in the Bodie Hills as described in Provencher, Low et al. 2009.

**1. Basin Wildrye-Basin Big Sagebrush**
A *Early*: 0-20% cover of basin wildrye
B *Mid--Closed*: 21-80% cover of basin wildrye
C na
D *Late-open*: 11-20% cover of big sagebrush; <75% cover of basin wildrye
E na
U *ShAG*; Shrub-Annual-Grass; 11-20% cover of big sage; 11-30% basin wildrye; <30% cover of cheatgrass
U *AG*: Annual-Grass; 10-40% cover of cheatgrass
U *TrEnc*: Tree-Encroached; 10-40% cover of pinyon/juniper; <10% herbaceous cover
U *TrAG*: Tree-Annual-Grass; 10-40% cover of pinyon/juniper; 5-20% cover annual grasses
U *EXF*: Exotic-Forbs; 20-100% exotic forbs (knapweed, tall whitetop, purple loosetrife)
U *ESH*: *Early*-Shrub; 0-40% cover of rabbitbrush species

**2. Low Sagebrush**
A *Early*: 0-10% herbaceous cover; 0-10% cover of rabbitbrush
B *Mid*1-*open*: 11-20% cover of low sage <0.5m; 10-20% herbaceous cover
C na
D na
E *Late*1-*open*: cover of trees 0-10% <5m; 15-25% cover of low sage; 5-20% herbaceous cover
U *ShAP*: Shrub-Annual-Grass-Perennial-Grass; 5-20% cover of low sage <0.5m; 5-20% native herbaceous cover; 5-15% cheatgrass cover
U *AG*: Annual-Grasses; 5-20% cheatgrass cover
U *TrEnc*: Tree-Encroached; 10-30% cover of trees; <5% herbaceous cover

**3. Montane Sagebrush Steppe**
A *Early*: 0-10% canopy of mountain sage/mountain brush; >50% grass/forb cover
B *Mid--open*: 11-30% cover of mountain sage/mountain shrub; >50% herbaceous cover
C *Mid--closed*; 31-50% cover of mountain sage/mountain brush; 25-50% herbaceous cover, <10% pinyon/juniper sapling cover
D *Late-open*: 10-30% cover pinyon/juniper <10m; 25-40% cover of mountain sage/mountain brush; <30% herbaceous cover
E *Late-closed*: 31-80% pinyon/juniper cover 10-25m; 6-20% shrub cover; <20% herbaceous cover
U *ESH*: *Early*-Shrub; 0-40% cover rabbitbrush species
U *TrEnc*: Tree-Encroached; 31-80% pinyon/juniper cover 10-25m; <5% shrub cover; <5% herbaceous cover
U *DPL*: Depleted; 31-50% cover of mountain sage/mountain brush; <5% herbaceous cover; <10% pinyon/juniper sapling cover
U *ShAG*: Shrub-Annual-Grass; 31-50% cover of mountain sage/mountain brush; 5-40%

cheatgrass cover; <10% pinyon/juniper sapling cover
U *ShAP*: Shrub-Annual-Grass-Perennial-Grass; 31-50% cover of mountain sage/mountain brush; 5-30% cover of native grass; 5-10% cheatgrass cover; <10% pinyon/juniper sapling cover
U *AG:* Annual-Grass; 10-30% cover of cheatgrass

**4. Mountain Shrub**
A *Early*: 0-40% shrubs <0.5m tall
B *Mid*1 –*closed*: 10-30% cover shrubs 0.5-2.9m tall
C *Late*1 –*closed*: 30-60% cover shrubs 0.5-2.9m tall
D *Late*1 –*open*: 5-15% cover pinyon/juniper 5-24m tall
U *TrEnc*: Tree-Encroached; 31-80% pinyon/juniper cover 10-25m, <5% shrub cover, <5% herbaceous cover
U *ESH*: *Early*-Shrub; 0-40% cover rabbitbrush species

**5. Wyoming Big Sagebrush: loamy**
A *Early*: 20-40% herbaceous cover, <10% cover of rabbitbrush species and Wyoming big sage
B *Mid*1-*open*: 11-20% cover Wyoming big sagebrush; 10-40% herbaceous cover
C *Late*1-*closed:* 20-40% cover of Wyoming big sage; <20% native herbaceous cover
D *Late*2-*open*: 0-10% pinyon or juniper <5m tall, 20-30% cover of Wyoming big sage; <10% native herbaceous cover
E *Late*2-*closed*: 11-60% pinyon or juniper <10m tall, 10% cover of Wyoming big sage; <10% native herbaceous cover
U *ShAP*: Shrub-Annual-Grass-Perennial Grass; 10-30% Wyoming big sage <0.5m, 5-20% native grass cover; 5-20% cover cheatgrass
U *ShAG*: Shrub-Annual-Grass; 10-30% Wyoming big sage <0.5m; 10-30% cover cheatgrass
U *DPL*: Depleted; 10-40% Wyoming big sage <1.0m; herbaceous cover <5%
U *AG*: Annual-Grass; 10-40% cover of cheatgrass
U *ESH*: Early-Shrub; >10% cover of rabbitbrush; native grass cover variable
U *TrEnc*: Tree-Encroached; 11-60% cover of trees 5-9m; <5% cover of cheatgrass; <5% cover of native grass
U *TrAG*: Tree-Annual-Grass; 11-60% cover of trees 5-9m; 5-20% cheatgrass cover

**6. Wyoming Big Sagebrush: sandy**
A *Early*: 10-25% herbaceous cover, <10% cover of rabbitbrush species and Wyoming big sage
B *Mid*--*open*: 11-20% cover Wyoming big sagebrush; 10-25% herbaceous cover
C *Late*-*closed*: 20-40% cover of Wyoming big sage; <15% native herbaceous cover
D *Late*2-*open*: 0-10% pinyon or juniper <5m tall, 20-30% cover of Wyoming big sage; <10% native herbaceous cover
E *Late*2-*closed*: 11-60% pinyon or juniper <10m tall, 10% cover of Wyoming big sage; <10% native herbaceous cover
U *DPL*: Depleted; 10-40% Wyoming big sage <1.0m; herbaceous cover <5%
U *DPL*: Depleted; 10-40% Wyoming big sage <1.0m; herbaceous cover <5%
U *TrEnc*: Tree-Encroached; 10-40% cover of pinyon or juniper

**7. Montane-Subalpine Riparian**
A *Early*; 0-50% cover of riparian shrubs (willow, cottonwood, buffaloberry); <3m
B na
C *Mid*1-*open*; 31-100% cover of riparian trees <10m
D na
E *Late*1-*closed*; 31-100% cover of riparian trees 10-24m
U *SFEnc*: Shrub-Forb-Encroached; 0-30% cover of shrubs and trees >3m
U *EXF*: Exotic-Forbs; 20-100% cover of exotic forbs (knapweed, tall whitetop, purple loosetrife), salt cedar, or Russian olive
U *DES*: Desertification; Entrenched river/creek with 10-50% cover of upland shrubs (e.g., big sage)

**8. Stable Aspen**
A *Early*; 0-100% cover of aspen <5m tall
B *Mid*1-*closed*; 40-99% cover of aspen <5-10m
C Na
D *Late*1-*open*; 0-39% cover of aspen 10-25 m; 0-25% conifer cover 10-25 m
E *Late*1-*closed*; 40-99% cover of aspen 10-25m; few conifer in mid-story
U *DPL-Open*: 10-50% cover of older aspen 10-25m; no or little aspen regeneration; few conifer in mid-story
U *NAS-all*: No Aspen; dead clone of aspen; 5-50% cover of mountain sagebrush/mountain shrub; <50% herbaceous cover
U *Uncharacteristic*: includes several uncharacteristic NAS classes as observed in montane sagebrush steppe biophysical setting

**9. Wet Meadow**
A *Early*-open: 0-60% herbaceous cover
B *Mid*--closed: 61-100% herbaceous cover
C Na
D *Late*-open: 0-10% tree-shrub cover; 60-80% herbaceous cover
E Na
U *SFEnc-All*: Shrub-Forb-Encroached; 0-10% cover of less palatable grasses and forbs; Bare ground cover 10-30% cover
U *EXF*: Exotic-Forbs; 20-100% exotic forbs (knapweed, tall whitetop, purple loosetrife)
U *DES*: Desertification; Entrenched water table with 10-50% cover of sagebrush
U *AG*: Annual-Grass; 10-30% cover of cheatgrass; < 10% shrub cover
U *TrEnc*: Tree-Encroached; 31-80% conifer cover 10-25m; <5% shrub cover; <5% herbaceous cover

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## D. Public Comments and BLM Responses

### NEPA Compliance

*Comment 1*
*An EIS must be prepared because of project scope and scale, and range of potentially significant and cumulative impacts.*

*Response 1*
The BLM has initially determined that the appropriate level of NEPA analysis required to make a decision on this proposed project is an EA. Page 1 of the *Summary* section of Chapter 1 of the EA describes the purpose of the EA as essentially a disclosure document, revealing the anticipated environmental effects from the proposed project alternatives. If the Bishop Field Manager determines based on analysis of the EA that there would be *significant* effects that cannot be mitigated to a level of non-significance, then an EIS would be prepared.

*Comment 2*
*Programmatic EA not adequate for Finding of No Significant Impact. A site-specific analysis is required by NEPA, including baseline data for a wide range of potentially impacted resources.*

*Response 2*
The *Programmatic Scope* and *Analysis Process for Subsequent Tiered Decisions on Treatment Units* sections of Chapter 1 of the EA starting on pages 7 and 8 provide BLM's reasoning for and CEQ's support of the use of programmatic analyses. This issue was also raised during public scoping and is addressed starting on page 238 of the *Analysis of Issues* section of Chapter 3 of the EA.

### Purpose & Need

*Comment 3*
*Purpose and Need are unclear and likely driver of the project (listing of Bi-state sage-grouse population) is not mentioned.*

*Response 3*
The Purpose and Need for this proposed project are as stated on page 7 in the *Purpose and Need for Action* section of Chapter 1 of the EA. Potential future listing of sage-grouse as a threatened or endangered species is not the "driver" of this project. Sage-grouse are mentioned as a sagebrush-dependent wildlife species that would benefit from the project.

*Comment 4*
*Bodie Hills are relatively intact (unfragmented) landscape, thus unclear why this area would be prioritized for proposed project. Conditions do not warrant high combined risks of the project.*

*Response 4*
Comments on fragmentation of the Bodie Hills were also received during public scoping for this project and are addressed starting on page 103 in the *Analysis of Issues* section of Chapter 3 of the EA. The Bodie Hills are relatively intact (or unfragmented) in terms of a lack of conversion to human uses such as agriculture or development and land management practices have largely maintained native ecological systems.

The *Purpose and Need for Action* section of Chapter 1 of the EA (page 7) describes why the project is important for the Bodie Hills. The treatments proposed in the action alternatives would not in themselves increase fragmentation, but would create greater seral diversity within ecological systems. Continued pinyon pine and juniper expansion into shrublands and potential large-scale transition to non-native annual grasslands following a wildfire would increase fragmentation in the Bodie Hills.

Chapter 3 of the EA (beginning on page 69) analyzes the environmental effects of all of the alternatives. All action alternatives include the *Design Features* found starting on page 35 of Chapter 2 of the EA. The design features are included to minimize any potential negative effects of the treatments on other resources. The *Design Features* also include a monitoring plan with provisions for adaptive management. The BLM has successfully used all of the treatment methods proposed in the action alternatives on past projects within the Bishop Field Office.

**Alternatives**

*Comment 5*
*Failure to consider alternative methods amounts to failure to consider a range of Alternatives.*

*Response 5*
The BLM analyzed 6 alternatives in detail and considered 4 other alternatives which were subsequently eliminated from detailed analysis. Except for the No Action Alternative (Alternative 1), each alternative includes at least 8 different treatment methods which may be employed singly or in combination to achieve the project's purpose and need. Two other treatment methods (mastication and herbicides) were analyzed in the TNC report but were not included in this EA for reasons discussed in the *Alternative 3: Increased Acreage* section of Chapter 2, found on page 44.

*Comment 6*
*A Reduced Grazing/Habitat Restoration Alternative should be included in the revised NEPA document.*

*Response 6*
Livestock grazing authorizations are analyzed separately to be in accordance with 43 Code of Federal Regulations (CFR) 4100 and consistent with the provisions of the Taylor Grazing Act (1934), as amended, the Public Rangelands Improvement Act (1978), and the Federal Land Policy and Management Act (FLPMA) of 1976. Livestock grazing in the Bodie Hills is in conformance with the Bishop Resource Management Plan and the Secretary of the Interior approved Central California Standards for Rangeland Health and Guidelines for Livestock Grazing.

*Comment 7*
*A Treatments Restricted to Sage-grouse Habitat Outside Grazing Allotments Alternative should be included in the revised NEPA document.*

*Response 7*
This alternative is similar in design and effects as Alternative 1 – No Action because nearly the entire project area is considered allotted for livestock grazing. The proposed project consists of 167,100 acres of BLM administered public land and of that only 2,448 acres (less than 1.5%) is considered un-alloted. This alternative would not meet the purpose and need of improving the ecological condition of the entire Bodie Hills landscape and reducing the departure from the natural range of variability because so few acres would be available for treatment.

*Comment 8*
*EA fails to present substantive data (including from previous experiments and pilot projects) that veg treatments in Alternatives will actually achieve the Purpose and Need.*

*Response 8*
The purpose of the proposed project is to improve the overall ecological condition and resiliency of the most ecologically departed and at risk upland vegetation systems in the Bodie Hills by preventing or limiting future increases in ecological departure and high risk vegetation classes and where possible by restoring some of the natural range of variability. Page 4 of the *Background* section of Chapter 1 of the EA summarizes the vegetation response findings in a report by the USGS (Matchett et al 2010) of a pinyon pine removal project conducted in the Rancheria Gulch area of the Bodie Hills.

The *Summary of Environmental Effects* starting on page Summary of Environmental Effects of the *Analysis of Issues* section of Chapter 3 of the EA compares the effectiveness of each alternative at achieving the project's purpose. Results are displayed both tabularly and graphically.

*Comment 9*
*Alternative 5, Limited Treatment in WSAs, and Alternative 6, No Treatment in WSAs, should include targeted sheep and goat grazing to protect Bodie State Historic Park from destruction via wildfire. This method was included in Alternative 3, Increased Acreage.*

*Response 9*
Alternatives 5 and 6 were developed in response to issues raised during public scoping about potential impacts to WSAs from the various vegetation treatment options presented in the proposed action. Alternative 5, *Limited Treatment in WSAs,* allows only for prescribed fire treatments within WSAs and Alternative 6, *No Treatment in WSAs*, does not allow for any vegetation treatments in WSAs. The Bodie WSA adjoins the north portion of Bodie State Historic Park and the Mount Biedeman WSA adjoins the southwest portion of the park and would preclude the installation of effective fuels reduction treatments using targeted grazing.

**Modeling**

*Comment 10*
*Use of Fire Regime Condition Class (FRCC), Natural Range of Variability (NRV), and Ecological Departure (ED) in modeling of Bodie Hills vegetation types is inadequate in concept, unproven, controversial, and lack both scientific and public review. Historic dynamism should be incorporated into development of NRV and these ranges should accommodate anticipated effects of climate past and future.*

*Response 10*
The analysis of Issues 1, 2 and 3 starting on page 76 of the *Analysis of Issues* section of Chapter 3 of the EA includes extensive background information, supporting documentation, and references for the use of FRCC, NRV, and ED in this project. The BLM acknowledges there are shortcomings with all models attempting to predict the complex interactions between numerous ecological systems, various climate change scenarios, disturbance events, and the influence of invasive species over time. The findings presented in the EA represent the best effort of the stakeholder group which included expertise from the BLM, TNC, and other agencies, groups, and individuals.

The analysis of Issue 6 starting on page 113 of the *Analysis of Issues* section of Chapter 3 of the EA summarizes recent published scientific research on vegetation dynamics through the Holocene and how climate change predictions were used in the modeling of future vegetation conditions.

*Comment 11*
*Recent papers (Baker 2006, 2011 and Bukowski and Baker 2013) suggest FRIs in sagebrush steppe are much longer than those used in TNC modeling effort, so less departure from NRV.*

*Response 11*
Fire Return Interval (FRI) in sagebrush ecosystems is challenging to calculate and numerous researchers have proposed a variety of methods to accurately characterize the frequency of fire in sagebrush vegetation. None of these methods used to examine FRI in sagebrush ecosystems provide direct measurements of fire history in sagebrush, but instead rely on proxy species or indirect estimates. Results have varied widely. At the extremes, Miller and Rose 1999, suggest a FRI in mountain big sagebrush of 12 to 15 years based on fire scars found on nearby ponderosa pine trees, while Bukowski and Baker 2013, suggest fire rotations of 137 to 217 years using General Land Office (GLO) surveys from the late 19$^{th}$ century to reconstruct historical vegetation conditions. Other authors, including Welch and Criddle 2003, and Kitchen and McArthur 2007, recommend historic fire frequency be estimated indirectly via post-fire vegetation recovery patterns. Using this method, Welch and Criddle propose a FRI in mountain big sagebrush of 50 years or more and Kitchen and McArthur a range of 40 to 80 years.
In the public workshops, BLM, TNC, and other stakeholder expertise was used to determine that the 40 to 80 year range suggested by Kitchen and McArthur fit well with observations made in the Bodie Hills by the stakeholders. Very short FRIs were ruled out as not providing adequate time for full sagebrush recovery and longer FRIs were eliminated as likely to result in further sagebrush conversion to woodlands.

*Comment 12*
*Further departure from the Natural Range of variability (NRV) are already minor under minimum management for the next 20 years.*

*Response 12*
As noted in the analysis of the effects under the No Action Alternative starting on page 81 of the *Analysis of Issues: Ecological Departure* section of Chapter 3 of the EA, because most of the ecological systems are already dominated by old vegetation classes, ecological departure does not continue to increase over the next 20 to 50 years. Page 7 of the *Purpose and Need for Action* section of Chapter 1 of the EA describes the intent of the project to improve overall ecological condition and resiliency of those vegetation types most departed in the Bodie Hills and the benefits to other natural resource components that would be derived from the project.

*Comment 13*
*Twenty-seven year Bodie Hills fire history data is inadequate for drawing conclusions about FRI and provides no info or estimate of burn areas if fire control had not been applied or if any of the 139 fires were left to burn unchecked.*

*Response 13*
The 27-year Bodie Hills fire history data discussed starting on page 107 of the *Analysis of Issues* section of Chapter 3 of the EA was presented in response to an issue raised in public scoping concerning the effect of the treatments on fire regimes. No conclusions about fire regimes were drawn from this data and Table 20, found on page 107, includes source information for the fire regimes and FRIs used for the Bodie Hills ecological systems modeled in the TNC report and documented in the biophysical setting models in Provencher, Low et al. 2009. Fire suppression

activities were initiated on all 139 reported fires and no information or estimates of potential fire size without suppression efforts exist.

*Comment 14*
*Existence of cheatgrass and threat of continued spread that makes wildfire in Bodie Hills a management problem - not departure from NRV.*

*Response 14*
The BLM agrees that one of the pre-eminent management concerns for the Bodie Hills is continued spread of cheatgrass, especially when associated with large-scale wildfire. However, the current landscape-wide departure from NRV with heavy emphasis toward late-seral conditions contributes to this concern. Relatively uniform and continuous fuel loads increases the risk of larger-scale, higher-intensity wildfire which increases the opportunity for cheatgrass expansion.

*Comment 15*
*Project reliance on remote sensing to generate vegetation data may have overlooked important diversity.*

*Response 15*
Page 238 of the *Analysis of Issues* section of Chapter 3 of the EA notes that "due to possible errors in the remote sensing and mapping process, the vegetation state descriptions will be used to identify units on the ground rather than the mapped state." Furthermore, pages 35 – 44 of Chapter 2 of the EA includes Design Features common to all action alternatives. These are intended to minimize negative effects of the treatments on other resources and include treatment unit analysis for presence of known or suspected sensitive plant populations or habitat. Potential habitat will be surveyed prior to treatment.

**Pinyon – Juniper**

*Comment 16*
*Historic distribution and characteristics of pinyon-juniper (P-J) woodlands should be provided in EA.*

*Response 16*
Issue 6 of the *Analysis of Issues* section of Chapter 3 of the EA starting on on page 113 provides an extensive review of the shifting nature of pinyon – juniper distribution and characteristics in response to climate change over the past several thousand years.

*Comment 17*
*Information on the role of livestock grazing and other BLM authorized activities in any changes in P-J distribution should be provided in the EA.*

*Response 17*
The *Background* section of Chapter 1 of the EA starting on page 1 acknowledges that pinyon – juniper distribution in the Bodie Hills has likely been influenced by past livestock grazing practices and wildfire suppression policies. Recent small-scale pinyon – juniper removal projects to enhance sage-grouse habitat or reduce fuels have also been authorized by the BLM. These effects on pinyon-juniper distribution were considered either in the direct, indirect, or cumulative effects analyses wherever appropriate. See in particular the discussion of cumulative effects for ecological departure starting on page 84.

*Comment 18*
*Matchett et al 2010, paper indicates thinning pinyon increases fine fuels that carry fires, thus project would increase fire risk in Bodie Hills.*

*Response 18*
Matchett et al 2010, suggest that the stimulation of live herbaceous cover by removing competing pinyon pine "may have important implications for fire spread by enhancing the continuity of surface fuels, especially during dry years." In describing "herbaceous cover," the authors make no distinction between grasses and forbs, perennials and annuals, and native and invasive species. In the case of invasive annual grasses such as cheatgrass, the BLM agrees with the comment. Part of the stated purpose for this proposed project is to limit future increases in ecological departure and high risk vegetation classes, as would be associated with the spread of cheatgrass. The *Method Selection Criteria* and *Design Features* sections of Chapter 2 of the EA starting on on pages 32 and 35 respectively include numerous provisions to limit the spread of invasive species. These provisions apply to all action alternatives. In the case of native grasses and forbs, these species are generally desirable on the landscape and would contribute to a return to the appropriate natural fire regime.

*Comment 19*
*P-J encroachment/expansion may be resulting from re-establishment into areas clearcut for fuelwood during Bodie mining era, responding to climate change, or simply undergoing a natural process of expansion/contraction that according to Miller and Tausch 2001, has occurred frequently over the last 10,000 years. Recent research by Millar in the nearby Wassuk Mtns. may indicate that much of the pinyon expansion in Bodie Hills is driven primarily by changing climatic conditions.*

*Response 19*
The BLM agrees that multiple factors have influenced or are influencing pinyon – juniper expansion in the Bodie Hills. The analysis of Issue 6 starting on page 113 of the *Analysis of Issues* section of Chapter 3 of the EA presents recent scientific research on the effects of changing climatic conditions, fire suppression, invasive species, and historic livestock grazing on pinyon – juniper woodlands and sagebrush ecosystems. The BLM agrees that some localized cutting of pinyon – juniper did occur to support mining at Bodie in the late-19$^{th}$ century, but these areas are often easily identifiable by the remaining cut stumps which still persist in the cool, dry climate of the Bodie Hills. This explanation also does not account for pinyon – juniper expansion across the entire Great Basin region of the western U.S.

*Comment 20*
*Assertion that BLM will not be treating "true pinyon" woodland, nor any "large" pinyon is not defined, is based on opinions and assumptions, lacks direct supporting evidence, and there is considerable scientific debate.*

*Response 20*
Each of the detailed descriptions of the action alternatives starting on page 23 of the Alternatives section of Chapter 2 of the EA includes tables displaying the vegetation types proposed for treatment and the strategies to be used. No treatments are proposed for pinyon – juniper woodlands in any of these alternatives and it is in these woodland areas where the oldest, largest pinyon pine and juniper trees are expected to be found. The methods descriptions beginning on page 31 of Chapter 2 of the EA refers to Taush et al. 2009 *Pinon and juniper field guide: asking the right questions to select appropriate management actions* as a guide that will be used to distinguish true pinyon juniper sites from expansion pinyon. All of the action alternatives include cutting younger, smaller pinyon pine and juniper trees which have expanded into the other vegetation types proposed for treatment. As noted in the Response to Comment 15, above, individual treatment unit vegetation conditions will be verified in the field to ensure the accuracy of the mapped state.

*Comment 21*
*EA fails to recognize that landscape will change as a result of climate change and the treatment of pinyon pine expansion does not connect Holocene climatic dynamics and veg response thru to NRV and ED analysis.*

*Response 21*
Issue 6 of the *Analysis of Issues* section of Chapter 3 of the EA starting on page 113 provides an extensive review of the movement of pinyon – juniper in response to climate change through the Holocene period. The analysis also projects future changes in distribution based on anticipated climate change scenarios for the next 50 years. The analysis of the use of NRV starting on page 76 of the *Analysis of Issues* section of Chapter 3 of the EA specifically points to the usage of Medieval Warm Period climatic conditions and vegetation response to inform the NRV and ED for the vegetation types modeled in this analysis.

**Sage-grouse**

*Comment 22*
*Information on Bi-state sage-grouse population trends should be provided in the EA.*

*Response 22*
The sage-grouse analysis starting on page 151 of the *Analysis of Issue*s section of Chapter 3 of the EA have been updated with additional sage-grouse population trend information. A Conservation Asssessment was also prepared and submitted to the FWS with additional analysis (USDI BLM 2014a).

*Comment 23*
*EA needs to explain how "Ecological Systems" of TNC model relate to sage-grouse winter, breeding, nesting, and brood-rearing habitats and the current condition of these habitats.*

*Response 23*
Additional information on ecological systems as they relate to grouse habitat was added to the sage-grouse analysis starting on page 151 of the *Analysis of Issues* section of Chapter 3 of the EA. The current condition of these ecological systems as it relates to High Risk Vegetation Classes and Ecological Departure was discussed in Issue 1 starting on page 76 of the *Analysis of Issues* section of Chapter 3 of the EA and the lack of early seral stages in these ecological systems as it relates to sage-grouse habitat was discussed on pages 156, 157, and 159.

*Comment 24*
*EA provides no information on locations that could provide more suitable sage-grouse habitat if treated, or how these areas will be identified.*

*Response 24*
The individual treatment units for a long-term program of restoration cannot be practically identified in advance, so this programmatic EA analyzes the criteria for identifying those locations and treatment methods in subsequent decisions. The *Programmatic Scope* and *Analysis Process for Subsequent Tiered Decisions on Treatment Units* sections of Chapter 1 of the EA found on pages 7 and 8 provide BLM's reasoning for and CEQ's support of the use of programmatic analyses. This issue was also raised during public scoping and is addressed starting on page 238 of the *Analysis of Issues* section of Chapter 3 of the EA.

*Comment 25*
*Unclear how BLM determined there is a "relative paucity of early and mid-seral sagebrush and mesic habitats that are important as early brood…"*

*Response 25*
The analysis of effects to sage- grouse starting on page 151 in the *Analysis of Issue*s section of Chapter 3 of the EA has been updated with additional sage-grouse information. Specifically, the lack of early and mid-seral sagebrush and mesic habitats in the Bodie Hills PMU is noted in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a). TNC analysis (Provencher, Low et al. 2009) also confirms the lack of early to mid-seral stages of relevant habitats.

*Comment 26*
*More likely that the ongoing degradation of riparian areas and meadows by livestock is a limiting factor for sage-grouse in the Bodie Hills because those areas are important brood-rearing habitat.*

*Response 26*
As discussed on page 156 of the *Analysis of Issues* section of Chapter of the EA, permitted livestock grazing is considered a low risk to sage-grouse in the Bodie Population Management Unit (PMU) based on the assessment in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a). Similarly, the FWS notes that the available data do not indicate that grazing is a major threat to habitat (USDI FWS 2010b). In their 2013 proposed rule, FWS states that grazing in the Bodie PMU currently poses minimal impacts (USDI FWS 2013b).

*Comment 27*
*Connelly et al 2004, paper suggests Rx fire is not beneficial to sage-grouse and Connelly and other researchers have documented negative effects to sage-grouse from fire. Baker 2006 also found negative effects to sage-grouse from Rx fire.*

*Response 27*
The *Method Selection Criteria* found starting on on page 32 of Chapter 2 of the EA indicates that prescribed fire would only be used where it is most likely to achieve the desired vegetation state and cause the least disturbance to other resources or risk of adverse outcomes, such as cheatgrass. The *Design Features* section of Chapter 2 of the EA starting on page 35 describes how prescribed fire would be implemented following the guidelines in Connelly et al. 2000 regarding limits on sagebrush treatments.

Connelly et al (2004) encourages land managers to be cautious with prescribed fire, stating, "Fire may have limited usefulness as a routine tool for managing for sage-grouse habitats in sagebrush communities and decisions to use fire for managing sage-grouse habitat must be made cautiously and on a site-by-site basis." The decision to use prescribed burning in this project would be on a site-by-site basis and would be limited by the sidebars in the *Design Features* section of the EA. Additional analysis regarding fire and sage-grouse habitat may be found starting on page 151 of Chapter 3and the Conference Assessment for the sage-grouse (USDI BLM 2014a).

Finally, this project was specifically identified in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a) as an action that would improve habitat to ensure the long term viability of the greater sage-grouse within the Bi-State DPS.

*Comment 28*
*Mowing shrubs may have a negative effect on sage-grouse. See Popham and Gutierrez 2003, Hess 2011, and Beck et al 2012 papers.*

*Response 28*
The *Method Selection Criteria* found starting on on page 32 of Chapter 2 of the EA indicates that mowing would only be used where it is most likely to achieve the desired vegetation state and cause the least disturbance to other resources or risk of adverse outcomes, such as cheatgrass. The *Design Features* section of Chapter 2 of the EA starting on page 35 describes how mowing would be implemented following the guidelines in Connelly et al. 2000 regarding limits on sagebrush treatments. Additional analysis regarding mowing and sage-grouse habitat may be found starting on page 151 of Chapter 3 and the Conference Assessment for the sage-grouse (USDI BLM 2014a).

Hess 2011 noted that while mowing did not promote an increase in some early brood rearing needs, it also stated that "mowing maintained minimum levels of sagebrush canopy cover recommended for sage-grouse nesting and early brood-rearing habitats."

Finally, this project was specifically identified in the Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a) as an action that would improve habitat to ensure the long term viability of the greater sage-grouse within the Bi-State DPS.

*Comment 29*
*Cutting P-J may have a negative effect on sage-grouse due to increased collisions with fencing and greater risk of predation from ravens perched on exposed fence posts. A cumulative effects analysis is needed for effects to sage-grouse from fencing/grazing. Dinkins et al 2012. Holloran and Anderson 2005.*

*Response 29*
The analysis of effects to sage-grouse starting on page 151 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to include the potential effects that conifer removal in the vicinity of existing fences could have on sage-grouse. Additionally, more analysis regarding conifer removal may be found in the Conference Assessment for the sage-grouse (USDI BLM 2014a).

*Comment 30*
*EA fails to take "hard look" and disclose effects to livestock from project that may in turn have negative effects to sage-grouse. Livestock displaced by vegetation treatments may directly impact sage-grouse by disturbing hens causing nest abandonment or predation by cattle on sage-grouse eggs. Coates et al 2008.*

*Response 30*
The analysis of effects to sage-grouse starting on page 151 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated, including effects to sage-grouse from displaced livestock resulting from post-treatment grazing rest periods

Coates et al. 2008, documented that one egg was eaten by a cow during his study and there were 5 other times grouse were flushed from nests by cows, but the eggs were not eaten. Sage-grouse are indeterminate nesters known to abandon nests when disturbed, but the potential for nest disturbance or trampling in the Bodie Hills is limited by permitted seasons of use, as well as livestock behavior. Authorized seasons of use in some allotments in Bodie Hills occur after the peak of the nesting season and this significantly reduces the potential for nest disturbance or trampling. Also, except when trailing, cattle do not travel in large groups or walk directly through sagebrush habitats in a manner that would likely crush or disturb a nest site.

*Comment 31*
*It is contradictory that drastic habitat alterations are needed for sage-grouse, despite take by hunters.*

*Response 31*
The purpose and need for this proposed project are as stated on page 7 in the *Purpose and Need for Action* section of Chapter 1 of the EA and are not driven by sage-grouse. Sage-grouse are mentioned on page 7 as a sagebrush-dependent wildlife species that would benefit from the project.

Page 157 of the *Analysis of Issues* section of Chapter 3 of the EA includes a discussion on why the California Department of Fish & Wildlife continues to authorize hunting of sage-grouse in the Bodie Hills.

*Comment 32*
*EA is incomplete because it does not incorporate recent (2013) USFWS report on conservation objectives for the greater sage-grouse, especially regarding the potential for veg treatments to increase cheatgrass and the recommendation that prescribed fire not be used in wintering and breeding habitats.*

*Response 32*
The proposed project incorporates many of the conservation objectives in the 2013 USFWS report. The analysis of effects to sage-grouse starting on page 151 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated with information from this recent report. The USFWS report recommends developing and implementing state and federal sage-grouse conservation strategies. Specifically, "state and federal agencies should work together to develop a plan…that includes clear mechanisms for addressing the threats to sage-grouse within PACs." The Bi-State Action Plan (Bi-State Technical Advisory Committee 2012a) meets this conservation objective.

The project also meets the conservation objective of implementing targeted habitat management and restoration. This project was specifically identified in the Bi-State Action Plan as an action that would improve habitat to ensure the long term viability of the greater sage-grouse within the Bi-State DPS.

Additionally, the 2013 FWS report states "Loss of PACs (e.g. through wildfire) will reduce the long-term viability of the greater sage-grouse and its habitats." This project is designed to reduce fuels and therefore reduce the risk of the loss of sage-grouse habitats.

While the 2013 FWS report recommends avoiding sagebrush removal or manipulation in sage-grouse breeding or wintering habitats, they do note that there may be exceptions when implementing habitat improvement or maintenance efforts. Additionally, in their Conference Report (USDI FWS 2014), the FWS states "We support the BLM' s plan to conduct habitat improvement projects within the Bodie Hills identified in the CA. The proposed action is designed to reduce sage-grouse impacts from any detectable or measurable disturbance by restricting the type, location, scale and timing of treatments. Secondly, adverse effects to proposed critical habitat are expected to be limited based on various adaptive management strategies detailed within the CA. Overall, the purpose of the Bodie Hills Upland Vegetation Restoration Project is to improve habitat conditions to benefit the sagebrush community and specifically manage for sage-grouse habitat improvements and reduce threats such as wildfire(s)."

Responses to Comments 49 - 54 address potential for treatments to increase cheatgrass and Responses to Comments 27 and 28 address the use of prescribed fire in sage-grouse habitat.

## Other Wildlife

*Comment 33*
*EA does not mention Migratory Bird Treaty Act (MBTA) and does not take "hard look" at effects to migratory birds such as Townsend's solitaire, loggerhead shrike, and State-threatened bank swallow. Gaines 1992, also reports an isolated population of white-crowned sparrows in mountain shrub habitat of Bodie Hills. Vegetation treatments should be scheduled after bird nesting season.*

*Response 33*
Page 42 of the *Design Features* section of Chapter 2 of the EA states: *"To reduce impacts to migratory birds, the project analysis and implementation will follow the guidance in the April 12th, 2010 MOU between the BLM and the US Fish and Wildlife Service (BLM MOU WO-230-2010-04) to promote the conservation of migratory birds."* Possible conservation measures for migratory birds were also added to the design features.

Page 175 of the Analysis of Issues section of Chapter 3 of the EA has been updated to include additional information regarding how the Migratory Bird Treaty Act and subsequent MOU relate to this project.

Townsend's solitare, loggerhead shrike and white-crowned sparrows are not BLM sensitive species; therefore there is no requirement to address them specifically. However, because the BLM will follow the guidance in the MOU, no impacts to these species are expected. The bank-swallow, which is a BLM sensitive species, has not been documented in the project area (CNDDB 2013). However, because the project will follow the guidance in the MOU, and because treatments would not change streambank structure, impacts from project activities to bank swallows are not expected.

*Comment 34*
*Critical pygmy rabbit habitat likely to be lost from project implementation as Wilson et al 2011 confirmed treated patches less used than untreated, and displaced livestock will likely impact habitat pygmy rabbit habitat. Wyoming big sagebrush should be included as pygmy rabbit habitat.*

*Response 34*
The anlaysis for pygmy rabbit starting on page 164 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated. The EA notes that the project would benefit pygmy rabbits by removing conifers that reduce habitat suitability and by reducing the risk of complete loss of habitat due to uncharacteristic wildfire. Recommendations from the Wilson et al 2011 paper are included. A discussion of displaced livestock effects is included. Wyoming sagebrush is included as an ecological type that pygmy rabbits may occur in.

*Comment 35*
*EA is inadequate because it fails to address likely negative impacts to mule deer and pronghorn. Livestock displaced by veg treatments may impact mule deer and pronghorn via competition for forage and potential for disease transmission.*

*Response 35*
The analysis starting on page 171 of the *Analysis of Issues* section of Chapter 3 of the EA discuss the potential impacts to mule deer and make the determination that the project will result in long-term habitat improvement. A discussion of the Beck et al 2012 research and impacts of displaced livestock were added to the analysis. Potential impacts to pronghorn were included in the general wildlife effects discussion starting on page 175 of the *Analysis of Issues* section of Chapter 3 of the EA.

*Comment 36*
*EA is inadequate because it fails to address impacts to Mono Lake mtn. beaver. Mountain beavers dig shallow burrows and show low post-fire survival (Fellers and Osbourne, 2009).*

*Response 36*
The Mono Lake Mountain Beaver is not a BLM sensitive species; therefore there is no requirement to address impacts to this species. Also, no Mountain Beaver have been documented in the project area (CNDDB 2013).

The Fellers and Osbourne 2009 paper was based in Point Reyes, a significantly wetter habitat than found in the Bodie Hills. The conclusion that post-fire there was low survival was based on a 12,000+ acre fire. No prescribed fires of this size are planned in this project. Also, the Mono Lake mountain beavers were found in wet seeps in sagebrush scrub and in thickets with willows, alder and cottonwood. Prescribed fire in mesic sites is proposed for 30 acres of Montane riparian, a portion of the 500 acres of Stable Aspen and 100 acres of Wet Meadows over 10 years. Because this is a small amount of habitat alteration over a long period of time, it is unlikely there will be adverse impacts to the Mono Lake mountain beaver.

*Comment 37*
*EA fails to indicate any consultation with Cal Fish & Wildlife, as required on page 12 of Bishop RMP* (USDI BLM 1993a).

*Response 37*
The *Consultation and Coordination* section of the EA found on page 272 has been updated to include the California Department of Fish & Wildlife.

*Comment 38*
*Moving late-successional aspen to earlier stages may impact cavity nesting birds and reduce overall biodiversity in Bodie Hills.*

*Response 38*
The analysis of effects to wildlife starting on page 175 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to include effects to birds and biodiversity from aspen treatments. PRBO 2011 research at Virginia Creek in the Bodie Hills found that prescribed burning and conifer removal in aspen stands had little short-term effect on avian species richness and diversity, and there was an increase in number of detections.

Additional analysis of project effects to aspen stands is included on starting on page 251 in the Vegetation section of Chapter 3 of the EA.

*Comment 39*
*EA analysis of American pika contains errors that should be corrected. 1) Pika not strictly an alpine/subalpine spp in Bodie Hills; 2) additional pika populations (post-Nichols surveys 2011) exist; and 3) proximity of talus forefields to livestock grazing should be evaluated.*

*Response 39*
The analysis of effects to pyka starting on page 169 of the *Analysis of Issues* section of Chapter 3 of the EA updated with recent findings on pika habitat and populations in the Bodie Hills and a statement that grazing could be a cumulative effect for pika populations.

**Vegetation**

*Comment 40*
*Multi-year vegetation surveys yielding a map at the alliance level is necessary to assess potential impacts. Mapping should include more accurate accounting for riparian and other "unique" habitats.*

*Response 40*
"Ecological systems" are a broader classification system that focuses on groups of vegetation associations and alliances. Vegetation mapping to the alliance level is not necessary because all vegetation alliances anticipated in the project area are within one of the ecological systems analyzed and likely effects from the various treatments are revealed.

The Purpose and Need on page 7 describes the need for restoration in upland ecological systems. Page 24 of the *Alternative 2: Proposed Action* section of Chapter 2 of the EA notes that the treatment of riparian areas is not the primary intent of the project and treatment would only occur if it was continuous with an upland treatment and beneficial for the riparian vegetation. Furthermore, as was noted in the Response to Comment 15 above, page 238 of the *Analysis of Issues* section of Chapter 3 of the EA indicates that "due to possible errors in the remote sensing and mapping process, the vegetation state descriptions will be used to identify units on the ground rather than the mapped state."

*Comment 41*
*Davies et al. 2012c found perennial forbs did not increase following mowing of Mountain sage-brush.*

*Response 41*
The BLM agrees that Davies et al 2012c *Vegetation Response to Mowing Dense Mountain Big Sagebrush Stands*, found that the mowing of mountain big sagebrush (Artemisia tridentata ssp. vaseyana) did not result in increases in perennial forbs. Page 138 of the *Issues* section of Chapter 3 of the EA has been modified to state that "native grasses and native annual forbs increased" as opposed to using the more general term "native understory."

*Comment 42*
*EA fails to evaluate effects to ten Sensitive plant species from prescribed fire and other disturbance. EA should provide general location and distribution of rare plants populations. Pre-treatment Design Features for sensitive plants are vague and unclear.*

*Response 42*
The analysis of effects to sensitive plants starting on page 121 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to clarify Sensitive plant status as used in this analysis and to include (to the extent known), additional Sensitive plant disturbance response findings. General distribution, location, and common habitat association information for these Sensitive plants is also reported.

The *Design Features* section of Chapter 2 of the EA starting on page 35 states, "potential (Sensitive plant) habitat will be surveyed before treatment," and therefore location information of Sensitive plants will be known and considered when deciding on the actual treatment units and methods. Clarifying information on how Sensitive plant design features would be incorporated into implementation has been added to the sensitive plant analysis starting on page 121 of the Analysis of Issues section of Chapter 3 of the EA.

*Comment 43*
*EA fails to consider additional CNPS List 2 species.*

*Response 43*
CNPS list 2 plants are not BLM Sensitive plants (see Response to Comment 42, above), but they will be included in pre-treatment survey efforts.

*Comment 44*
*EA fails to specifically identify any post-treatment monitoring of rare plants, which would be needed to truly utilize Adaptive Management as a strategy to alter treatment methods.*

*Response 44*
The monitoring plan found on page 42 of the *Design Features* section of Chapter 2 of the EA has been updated to include post-treatment monitoring of Sensitive plants.

*Comment 45*
*EA provides no documentation that benefits to ecological systems would actually improve sensitive plant habitat.*

*Response 45*
It is not the specific purpose of the project to improve Sensitive plant habitat. The analysis of effects to sensitive plants starting on page 121 of the *Analysis of Issues* section of Chapter 3 of the EA discusses specific benefits to some of the most important Sensitive plant habitat types in the Bodie Hills from implementation of the proposed treatments.

*Comment 46*
*The three riparian types are not adequately evaluated for potential effects, provide critical biodiversity, and likely contain rare plant communities.*

*Response 46*
The *Analysis Required by Other Authorities* section of Chapter 3 of the EA analyzes the effects of the various alternatives to aspen starting on page 251 and to wetlands and riparian zones starting on page 262. As noted in the Response to Comment 40 above, if the Proposed Action is implemented, less than 4% of the acres treated would occur in the three associated riparian types.

Of the ten Sensitive plant species that are known or reported to occur in Bodie Hills, only two occur in meadow/riparian habitats. See the analysis of effects to sensitive plants starting on page 121 of the *Analysis of Issues* section of Chapter 3 of the EA for analysis of potential effects to these two species.

*Comment 47*
*EA identifies plant communities by common name only. Lack of scientific names makes it impossible to accurately comment on vegetation component of EA.*

*Response 47*
Page 24 of the *Alternative 2: Proposed Action* section of Chapter 2 of the EA has been updated directing readers to where a description of the ecological systems/plant communities can be found.

*Comment 48*
*Conifer species rare in the Bodie Hills should be mapped, addressed, and protected from proposed treatments as they are valuable for scientific research.*

*Response 48*
The commenter identified "rare conifers" as, limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorata*), Jeffrey and ponderosa pine (*Pinus jeffreyi* and *P. ponderosa*) and acknowledged that they are common in the nearby Sierra Nevada. If stands or individual trees of these species are known or found to occur within a treatment unit, their inclusion or exclusion in the prescribed treatment would be evaluated on a case-by-case basis in terms of likely response to the prescribed treatment.

**Invasive Species**

*Comment 49*
*Proposed treatments such as Rx fire may actually increase cheatgrass. Pilot project at Rancheria Gulch cited. EA needs to better disclose uncertainties, risks, probabilities of No Action vs. Proposed Action.*

*Response 49*
The BLM acknowledges that some of the treatment methods have the potential to increase cheatgrass. *Method Selection Criteria* and *Design Features* sections of Chapter 2 of the EA found starting on page 32 are included to minimize this risk. The analysis of effects on cheatgrass starting on page 132 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to better disclose the effects of the No Action vs. the Proposed Action alternatives.

Matchett et al, 2010 reported that at Rancheria Gulch, cheatgrass abundance varied greatly among the plots, but no statistically significant effects for cover were found. See page 138 in the *Analysis of Issues* section of Chapter 3 of the EA.

*Comment 50*
*Davis et al 2012, Beck et al 2012 papers indicates native perennials did not respond to mowing of Wyoming big sagebrush, but cheatgrass did.*

*Response 50*
As noted in Response to Comment 49, above, the BLM acknowledges that some of the treatment methods have the potential to increase cheatgrass. *Method Selection Criteria* and *Design Features* sections of Chapter 2 of the EA found starting on pages 32 are included to minimize this risk. The analysis of effects on cheatgrass starting on page 132 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to better disclose the effects of the No Action vs. the Proposed Action alternatives.

*Comment 51*
*It makes no ecological sense to fragment a "largely unfragmented landscape" such as the Bodie Hills. Just opens the Bodie Hills to invasion by cheatgrass. Unfragmented landscapes more resistant to invasions. Debinski et al 2000, Knick et al 1997.*

*Response 51*
Comments on fragmentation of the Bodie Hills were also received during public scoping for this project and are addressed starting on page 103 in the *Analysis of Issues* section of Chapter 3 of the EA. The Bodie Hills are relatively intact (or unfragmented) in terms of a lack of conversion to human uses such as agriculture or development and land management practices have largely maintained native ecological systems.

The *Purpose and Need for Action* section of Chapter 1 of the EA (page 7) describes why the project is important for the Bodie Hills. The treatments proposed in the action alternatives would not in themselves increase fragmentation, but would create greater seral diversity within ecological systems. Continued pinyon pine and juniper expansion into shrublands and potential large-scale transition to non-native annual grasslands following a wildfire would increase fragmentation in the Bodie Hills.

*Comment 52*
*Matchett et al 2010, paper states that attempts to restore P-J encroached shrub-steppe to FRCC1 conditions may increase cheatgrass dominance, promote recurrent fire, and push landscapes into non-native annual grasslands.*

*Response 52*
Comment 52 is not the findings of Matchett et al 2010, but rather the statement is included in the *Background and Purpose* section of the report to help define the need for the study. See Response to Comment 49, above, for actual findings by Matchett et al 2010 concerning cheatgrass.

*Comment 53*
*EA lacks specificity on monitoring and Adaptive Management plan for invasive spp. Essential in light of cheatgrass expansion potential and for full public understanding of the project.*

*Response 53*
The Monitoring Plan on page 42 of the *Design Features* section of Chapter 2 of the EA states that the treatments proposed in this project would be included in the Bishop BLM – Inyo National Forest Interagency Vegetation Treatment Monitoring Program and as indicated in the *Design Features* section of Chapter 2 of the EA starting on page 35, additional monitoring would occur for cultural resources, invasive plants, and sensitive plant species. See Response to Comment 80, below, for additional specificity on monitoring and adaptive management.

*Comment 54*
*EA fails to emphasize the critical role of native perennial grass cover in conferring resistance to invasion of cheatgrass. Establishment of native grasses by seeding is difficult and if not successful could result in cheatgrass establishment and spread.*

*Response 54*
The BLM agrees that perennial grasses play an important role in allowing sites to be both resistant to cheatgrass invasion as well as resilient in the event of invasion. The analysis of effects on cheatgrass starting on page 132 of the *Analysis of Issues* section of Chapter 3 of the EA have been updated to more clearly state the important role of perennial grasses in making sites more resistant/resilient to cheatgrass invasion.

The BLM agrees that establishing native grasses through seeding treatments can be difficult. The *Method Selection Criteria* and *Design Features* sections of Chapter 2 of the EA starting on page 32 include provisions to minimize the need for post-treatment re-seeding and have been updated to reflect a more pro-active approach.

*Comment 55*
*Gillihan, 2006 found that pile burning in P-J woodlands can lead to dead zones easily invaded by non-native spp.*

*Response 55*
The BLM has successfully used pile burning in pinyon – juniper in the Bodie Hills for many years with only minor increases in cheatgrass noted in the vicinity of the pile burn sites. Chapter 3 of the EA (beginning on page 69) analyzes the environmental effects of all of the alternatives.

All action alternatives include the *Design Features* found starting on page 35 of Chapter 2 of the EA. The design features are included to minimize any potential negative effects of the treatments on other resources. The *Design Features* also include a monitoring plan with provisions for adaptive management.

**Climate & Carbon**

*Comment 56*
*The fragmentation caused by project will exacerbate spp adaptation to changing climate. Peterson et al 2011 found that actions that attempt to resist climate change are usually only successful in the short-term and become less effective over time.*

*Response 56*
Response to Comment 4 notes that the Bodie Hills are relatively intact (or unfragmented) in terms of a lack of conversion to human uses such as agriculture or development and land management practices have largely maintained native ecological systems. The treatments proposed in the action alternatives would not increase fragmentation, but would create greater seral diversity within ecological systems.

The BLM does not dispute the finding by Peterson et al 2011 regarding the limited success of actions designed to resist climate change. The purpose of the vegetation treatments proposed in this project as described on page 7 of the *Purpose and Need for Action* section of Chapter 1 of the EA is not to resist climate change, but to "improve the ecological conditions and resiliency of the most ecologically departed and at-risk upland vegetation systems in the Bodie Hills." Predicted climate change scenarios for the next 50 years are used to inform NRV and ED for the various ecological systems.

*Comment 57*
*Analysis must include a discussion of carbon sequestration by sage, not just pinyon - juniper. Carbon loss by wildfires may not happen, as wildfire may never happen, whereas carbon loss to treatments would definitely occur. Also, analysis of effect of fossil fuel powered equip to implement project is needed.*

*Response 57*
The analysis of effects to ecosystem services including carbon sequestration staring on page 187 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to include analysis of carbon sequestration by shrubs.

The opinion offered by Strand et al 2008, on page 187 of the EA, that the extra carbon sequestration by pinyon – juniper expansion is very likely to be lost in wildfires is from researchers working in the field of carbon sequestration. The BLM agrees with this opinion.

An analysis of the effect of the fossil fuel powered equipment necessary to implement the proposed treatments on climate change is not included because the vast number of greenhouse

gas emission sources worldwide makes it impossible to determine the effects from this one project, but it is anticipated that the effect would be miniscule on all scales and would not differ measurably from the No Action Alternative.

*Comment 58*
*Tertiary veg history is oversimplified and generates error in summarizing the baseline for Bodie Hills ecosystems. See Millar 1996 and Millar 2012.*

*Response 58*
This paragraph was provided only as background information to a discussion on Bodie Hills vegetation trends back to the beginning of the Holocene discussed on page 109 – 116 of the *Analysis of Issues* section of Chapter 3 of the EA. This paragraph has been removed from the EA.

*Comment 59*
*Commenter questions sources for "early Pleistocene" documentation that "dominate spp…were all present in the area."*

*Response 59*
The source for this statement is;
Nowak, C.L., R.S. Nowak, R.J. Tausch, and P.E. Wigand. 1994. Tree and shrub dynamics in the northwest great basin woodland and shrub steppe during the late-pleistocene and Holocene. *American Journal of Botany* 81(3): 265-277.

This paragraph on pages 109 and 110 of the *Analysis of Issues* section of Chapter 3 of the EA has been re-written for greater clarity.

*Comment 60*
*Pinyon pine history is oversimplified. See Grayson 2011 and West et al 2007.*

*Response 60*
The BLM agrees that Grayson 2011 and West et al 2007 document the arrival and spread of pinyon pine in the Great Basin during the Holocene more thoroughly than is presented in the EA, but that the subject is discussed in enough detail to address the issue as brought forth during public scoping and inform an eventual decision.

*Comment 61*
*Historic climate response varied across Great Basin, thus proxy paleo-information must be extended with care.*

*Response 61*
The BLM agrees with the comment.

*Comment 62*
*The middle Holocene (7,500 to 5,000 years before present) is widely evaluated to have been the warmest* ***and*** *driest portion (so far) across much of our region (emphasis carried through from commenter's letter).*

*Response 62*
Text is unchanged, as the statement on page 110 of the *Analysis of* Issues section of Chapter 3 of the EA is from published scientific research.

*Comment 63*
*The post-neoglacial drought was anomalously extensive and severe drought. Its impacts last to the present on geomorphology of basin sedimentation and channel incision. Comments about the latter in the EA should be reviewed against this longterm perspective on historical legacy. See Miller et al 2004.*

*Response 63*
The EA does not discuss the geomorphology of basin sedimentation or channel incision.

*Comment 64*
*Medieval Period was drier rather than wetter at high elevations in adjacent Sierra Nevada. See Millar et al 2006.*

*Response 64*
The statement on page 110 of the *Analysis of Issues* section of Chapter 3 of the EA indicating a warmer and wetter climate in the Great Basin during the Medieval Period is relative to the preceding post-neoglacial drought. Millar et al 2006 conducted research at sites in the nearby Sierra Nevada and found slightly drier conditions (approximately one inch less precipitation annually) than present annual precipitation.

*Comment 65*
*The Little Ice Age persisted until approximately 1925, with variable precipitation patterns. Post-Little Ice Age climate was anomalously wetter (except for the 1930s) than much of the preceding 1000 years. See Graumlich 1993.*

*Response 65*
Research continues to refine the dates for the various climatic periods found during the Holocene. The 650 to 150 years BP period used on page 110 of the *Analysis of Issues* section of Chapter 3 of the EA is an adequate approximation of the Little Ice Age and is supported by the three sources cited. Graumlich 1993 also suggests the Little Ice Age ended around 1850. Grayson 2011 suggests the Little Ice Age ended around 1900.

The BLM agrees that within the Little Ice Age there were drier and wetter periods than present. The statement on page 110 of the *Analysis of Issues* section of Chapter 3 of the EA indicating generally cooler and wetter conditions is relative to other periods in the second half of the Holocene and is supported by the three sources cited. Grayson 2011 also refers to research which supports the existence of a generally cooler and wetter Great Basin between the years 1400 to 1900.

The statement on page 111 of the *Analysis of Issues* section of Chapter 3 of the EA suggesting a warmer and drier climate after 1916 is supported by the three sources cited. The BLM acknowledges the somewhat findings of Graumlich 1993 in the subalpine conifer species of the southern Sierra Nevada.

*Comment 66*
*No strong long-term precipitation trends for our area during the 20th century. See Millar et al 2007 and Millar et al 2012.*

*Response 66*
The statement on page 111 of the *Analysis of Issues* section of Chapter 3 of the EA indicating a warmer and drier climate after 1916 is relative only to the preceding cooler and wetter Little Ice Age period and is not suggestive of any long-term precipitation trend.

*Comment 67*
*Basis for undertaking treatments described in EA would be better justified to commenter as derived from climate-adaptation assessments and strategies, rather than NRV and ED. See Peterson et al 2011.*

*Response 67*
Page 7 of the *Purpose and Need for the Action* section of Chapter 1 of the EA indicates the project need is driven by the current and predicted conditions for key upland ecological systems. Projected changes in climate were included in the modeling of future conditions under the various management scenarios. The EA documents the relatively intact condition of the Bodie Hills when compared to other areas in the Great Basin where large-scale wildland fire and cheatgrass have completely altered ecological conditions. The BLM believes this project will improve the overall ecological condition and resiliency of the Bodie Hills.

## Fire

*Comment 68*
*EA indicates acres burned by wildfire will be deducted from number of acres to be treated. Not good rationale for not continuing to treat high-priority acres.*

*Response 68*
The BLM agrees with the comment. The Bishop RMP was amended by the Bishop Fire Management Plan (FMP) in 2005 with language limiting treatments using prescribed fire and mechanical means to 23,899 acres per 10-year time period when wildfires during the same time period remain under 3,186 acres (USDI BLM 2005a, USDI BLM 2005b). Should a situation arise as suggested by the commenter, the BLM could propose an RMP amendment to allow important restoration work to continue in the Bodie Hills.

*Comment 69*
*Analysis should provide data on frequency of lightning fires, extent of burn, control rate by firefighters, and data on vegetation response. Lightning fires contribute substantially to the current Bodie Hills NRV. EA assertion of unnatural distribution of vegetation seral classes is not supported.*

*Response 69*
The analysis of the effects on the fire regime staring on page 106 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to include wildfire ignition source data, extent of burn, and control rate by firefighters with respect to lightning-caused wildfires.

Wildfires in the Bodie Hills, whether lightning-caused or human-caused, that result in early-seral native vegetation replacing older vegetation normally makes a positive contribution to restoring NRV. The *Background* section of Chapter 1 of the EA describes how the presence of cheatgrass changes the wildfire dynamic and potentially could result in a transition of large areas of the Bodie Hills to the non-native annual grass. This transition has been seen elsewhere in large portions of the Great Basin.

The unnatural distribution of vegetation seral classes is discussed on page 5 of the *Background* section of Chapter 1 of the EA and is based on the findings of the Provencher, Low et al. 2009 report.

## Grazing

*Comment 70*
*EA fails to mention that most Bodie Hills grazing allotments failed to meet riparian standards in the Land Health Assessments due to livestock impacts. To restore riparian and meadow areas to benefit wildlife, BLM needs to permanently remove livestock from these areas.*

*Response 70*
Livestock grazing authorizations are analyzed separately to be in accordance with 43 Code of Federal Regulations (CFR) 4100 and consistent with the provisions of the Taylor Grazing Act (1934), as amended, the Public Rangelands Improvement Act (1978), and the Federal Land Policy and Management Act (FLPMA) of 1976. Livestock grazing in the Bodie Hills is in conformance with the Bishop Resource Management Plan and the Secretary of the Interior

approved Central California Standards for Rangeland Health and Guidelines for Livestock Grazing.

*Comment 71*
*EA fails to address relative roles of historic and traditional grazing in producing "depleted understories."*

*Response 71*
The *Background* section of Chapter 1 of the EA found starting on on page 1 provides an overview of the many factors influencing current conditions in the Bodie Hills, including; climate and atmospheric changes, active wildfire suppression, changes in Native American land use patterns, establishment of non-native annual grasses, and domestic livestock grazing. All of these factors likely have contributed to vegetation types with depleted understories and it is not possible to determine the extent to which each factor has contributed to the current conditions.

The BLM manages domestic livestock grazing in the Bodie Hills in accordance with 43 Code of Federal Regulations (CFR) 4100 and is consistent with the provisions of the Taylor Grazing Act (1934), as amended, the Public Rangelands Improvement Act (1978), and the Federal Land Policy and Management Act (FLPMA) of 1976. Also, livestock grazing is in conformance with, the Bishop Resource Management Plan and the Secretary of the Interior approved Central California Standards for Rangeland Health and Guidelines for Livestock Grazing.

*Comment 72*
*Post-veg treatment grazing should be adaptive (based on site-specific conditions) instead of prescriptive (rested for two or three years). Cited numerous papers indicate longer rest periods are needed after Rx and wild fires.*

*Response 72*
The *Design Features* section of Chapter 2 of the EA starting on page 35 indicates that the 2- or 3-year rest periods required by the Bishop RMP following vegetation treatments and prescribed fire activities respectively, will be extended by the Bishop Field Manager if an interdisciplinary monitoring process reveals that the vegetation response is different than what is anticipated.

**Soils**

*Comment 73*
*Numerous small drainages and springs makes it unlikely that even low PSI rubber-tracked vehicles can avoid wet soils or may even have impacts to dry soils.*

*Response 73*
As indicated by the EA title, the primary focus of this project is upland vegetation types, generally not associated with small drainages and springs. The Design Features section starting on page 35 of Chapter 2 of the EA indicates the treatments are designed to meet the requirements

of the Lahontan Regional Water Quality Control Board timber waiver regulations. Numerous design features are listed here and incorporation of these design features during implementation are anticipated to result in only minor, short-term negatives effects to water quality and soils.

*Comment 74*
*Gillihan 2006, reports the soils in some pinyon-juniper woodlands are held in place by a biological soil crust. Fragile soils could easily be damaged by treatments. How does BLM plan to preserve fragile soils?*

*Response 74*
The comments in Gillihan 2006 concerning fragile biological soil crusts are in reference to pinyon – juniper woodlands. Page 24 of the *Alternatives* section of Chapter 2 of the EA indicates pinyon-juniper woodlands will not be treated under this project. Pinyon – juniper will only be treated where they are encroaching into shrublands.

**Cultural Resources**

*Comment 75*
*Lacking a complete survey for cultural resources, it is impossible to say project would have insignificant effects to these resources.*

*Response 75*
The *Design Features* section starting on page 35 of Chapter 2 of the EA indicates that cultural resources within the proposed project area would be identified by conducting a records search of previously identified resources, tribal consultation, and an intensive cultural resource survey within the Area of Potential Effect (APE) and evaluated prior to project approval for the individual treatment units.

*Comment 76*
*Risk of loss of cultural resources to out-of-control Rx fire vs. wildfire not calculated in EA.*

*Response 76*
The *Design Features* section starting on page 35 of Chapter 2 of the EA lists four *Standard Resource Protection Measures (SRPMs)* typically used to protect cultural resources during prescribed fire operations. Prescribed fire is a planned event with appropriate SRPMs in place and conducted under conditions favorable for ensuring cultural resource protection objectives are met. Wildfire is an unplanned event often occurring when there are inadequate resources and time to safely protect all threatened cultural resources and thus are at far greater risk to loss than in a prescribed fire.

*Comment 77*
*Late-successional aspen groves often contain arborglyphs carved by Basque sheepherders and should be protected.*

*Response 77*
Aspen carvings (arborglyphs) by Basque sheepherders would be evaluated and, if necessary, protected as discussed in *Response 75* and *Response 76*, above.

**Wilderness Study Areas**

*Comment 78*
*EA fails to provide evidence that Rx fire would benefit natural resources of WSAs or that natural systems would be self-sustaining after treatments.*

*Response 78*
The EA documents benefits of prescribed burning for multiple natural resources of the WSAs by comparison of Alternatives 5 (prescribed burning only in WSAs) and Alternative 6 (no treatment in WSAs). Specific beneficial effects are documented in *Analysis of Issues* section of Chapter 3 of the EA for *Issue 1*: Ecological Departure (compare Table 18 and Table 19), *Issue 5*: Fire Regime, *Issue 7*: Special Status Plants, *Issue 8*: Invasive plants, *Issue 12*: Wildlife (sage-grouse, pygmy rabbit, mule deer, and other wildlife species), and *Issue 20*: WSAs, among others.

The analysis of effects to WSAs starting on page 216 of the *Analysis of Issues* section of Chapter 3 of the EA has been updated to clarify how the analysis conforms to the direction in the BLM WSA manual at 1.6.D.8.b.iii.F.

The EA analyses the ability of the natural systems to be self-sustaining after treatments through restoration of the natural fire regime as described in the BLM manual for management of WSAs (6330 1.6.D.8.b.iii.F) (USDI BLM 2012e). This analysis appears in the analysis of fire regimes starting on page 106 of the *Analysis of Issues* section of Chapter 3 of the EA and the indirect effects of the fire regime on vegetation, wildlife, and watershed processes analyzed throughout Chapter 3.

*Comment 79*
*Removing vegetation from WSAs detracts from wilderness aesthetics.*

*Response 79*
The *Design Features* section starting on page 35 of Chapter 2 of the EA includes measures that would be implemented in order to minimize visual impacts of the project within WSAs. The effects of the project on the wilderness characteristics of the three WSAs located within the project area, including the appearance of naturalness, are considered starting on page 216 of the *Analysis of Issues* section of Chapter 3 of the EA. The BLM agrees that treatment will temporarily affect visual resources and the appearance of naturalness in WSAs, but

implementation of the project utilizing the design features will result in effects to visual resources that are substantially unnoticeable after one growing season.

## Monitoring & Adaptive Management

*Comment 80*
*EA needs to include a detailed, spatially and temporally explicit Adaptive Management plan because of the many questions surrounding the landscape-scale effects of this 10-20 year project.*

*Response 80*
The monitoring plan on page 42 of the *Design Features* section of Chapter 2 of the EA states that the treatments proposed in this project would be included in the Bishop BLM – Inyo National Forest Interagency Vegetation Treatment Monitoring Program. The primary measures of this monitoring program include fuel loads, vegetation structure, and fire effects (for prescribed fire treatments). Provisions for longer-term monitoring are included. As indicated in the *Design Features* section of Chapter 2 of the EA starting on page 35, additional post-treatment monitoring would occur for cultural resources, invasive plants, and sensitive plant species.

The monitoring plans described in the *Design Features* section of the EA and outlined above would inform the need for any changes in treatment methods. A detailed, spatially and temporally explicit adaptive management plan cannot be included in the EA because there is no assurance that such a plan would provide the most appropriate response to an undesirable treatment result. As noted in the Response to Comment 4 above, the BLM has successfully used all of the treatment methods proposed in the action alternatives on past projects within the Bishop Field Office. None of the treatment methods is experimental and the anticipated effects are expected to be similar to those seen on previous projects and are analyzed in Chapter 3 of the EA.