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.

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 is 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 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 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 on page 259.

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 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 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 et al 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 et al report for details on the methods used (Provencher, Low et al. 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 1 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 et al 2009 which is incorporated by reference.

Table 1. Changes in Ecological Departure (Fire Regime Condition) with No Action as modeled in Provencher 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 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 2. Changes in High Risk vegetation classes with No Action as modeled in Provencher 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 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 3. 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.

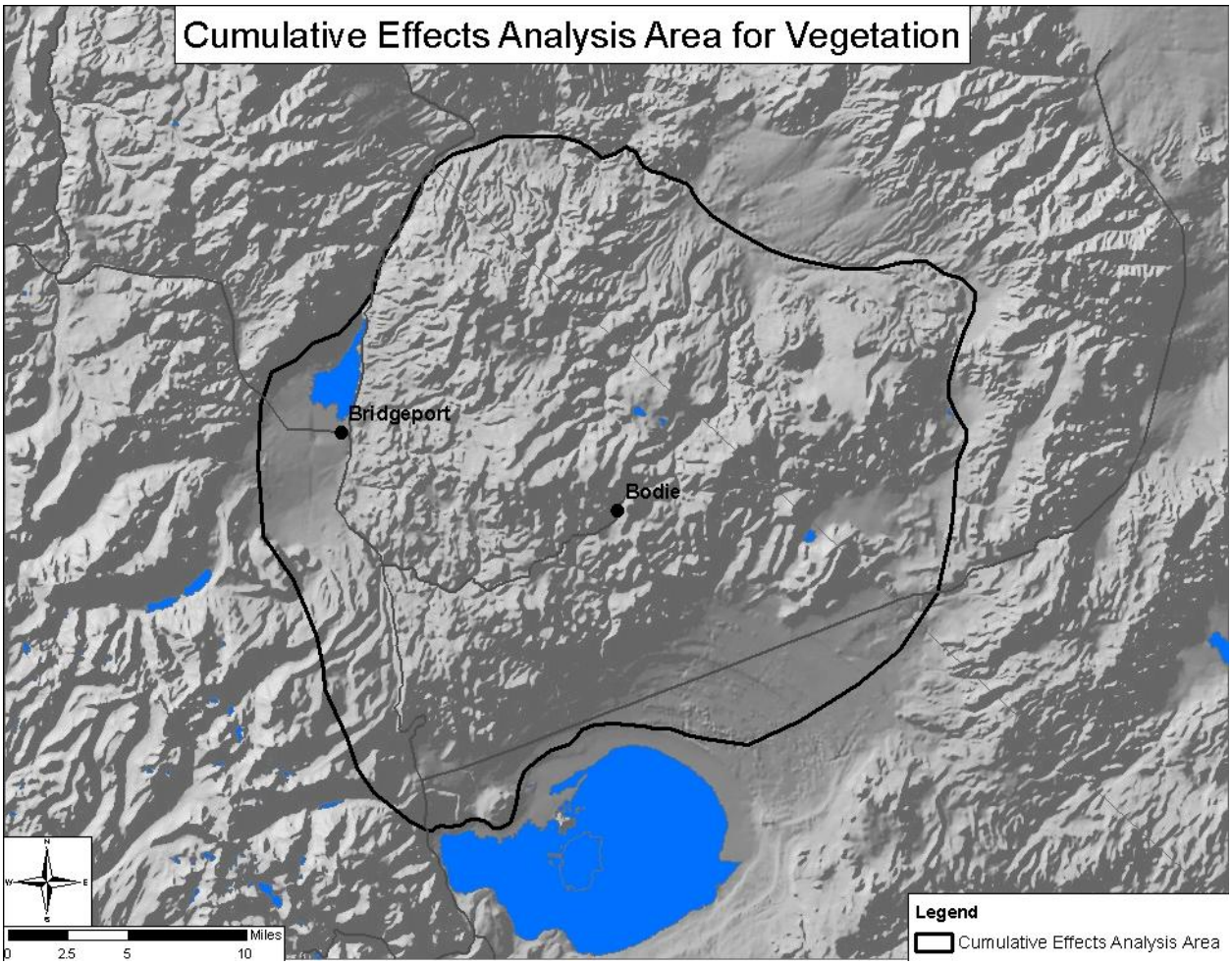


Figure 6. Cumulative effects analysis area for vegetation effects.

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. 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 on pg. 102). 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 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 – Wyoming 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). 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 4. Changes in Ecological Departure (Fire Regime Condition) under the Proposed Action as modeled in Provencher 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 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 5. Changes in the proportion of High Risk vegetation under the Proposed Action as modeled in Provencher 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 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 6). 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 6). 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 6. 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 7 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 report as the “Ecological

Management Scenario." 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 et al (2009). The treatments modeled in Provencher et al for Low Sagebrush emphasized early sheep grazing but the modeling found that this would not have a measureable effect on Ecological Departure. 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. 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 7. 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 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 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.

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 et al, 2009 pg. 113).

Table 8. Changes in the proportion of High Risk vegetation for the three ecological systems with increased treatment under Alternative 3 (See table in the analysis of the Proposed Action for predicted values of the other ecological systems). Values are based on the results of modeling in Provencher et al 2009 (see the Ecological Management 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 Alternative 3 (See Provencher 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.

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 9).

Table 9. 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 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. 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 10).

Table 10. 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 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). 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 11).

Table 11. 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 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. 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 12).

Table 12. 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).

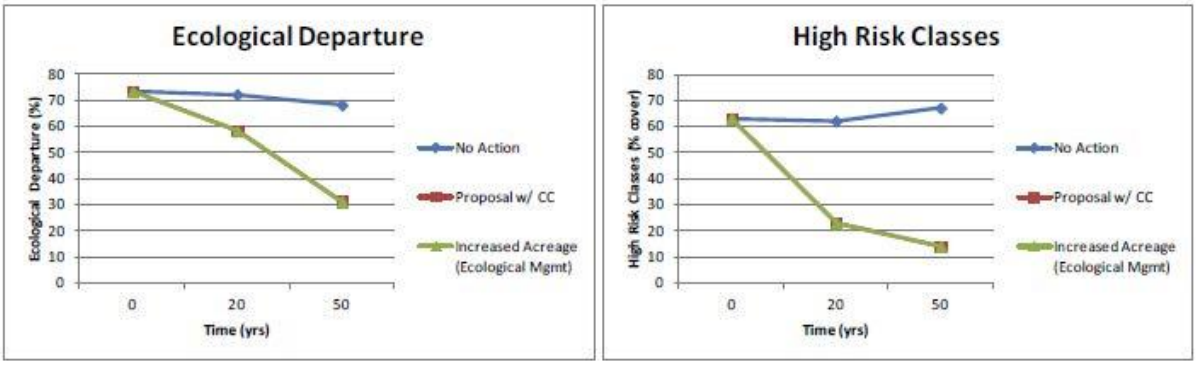
Because large changes in Ecological Departure are not feasible with the current constraints, other measures can be more informative. The proportion of vegetation in High Risk classes is important to the risk that large shifts and undesirable changes in the ecological system may occur. Increases in High 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.

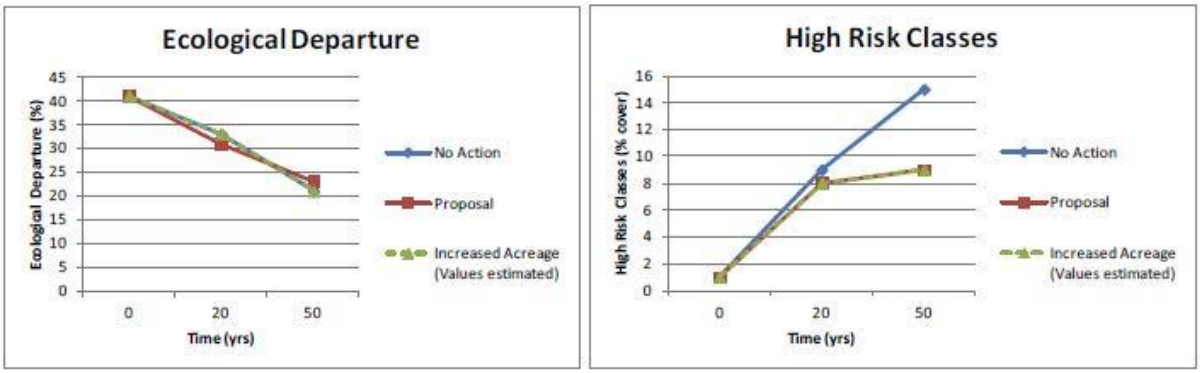
Another measure of the effects of the treatments is the acres of key seral classes created on the landscape. The Proposed Action would double the amount of currently underrepresented early seral classes in shrubland habitats. These early seral classes are important to wildlife and fire behavior (see 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 below.

Basin wildrye – big sagebrush



Low sagebrush



Montane sagebrush steppe

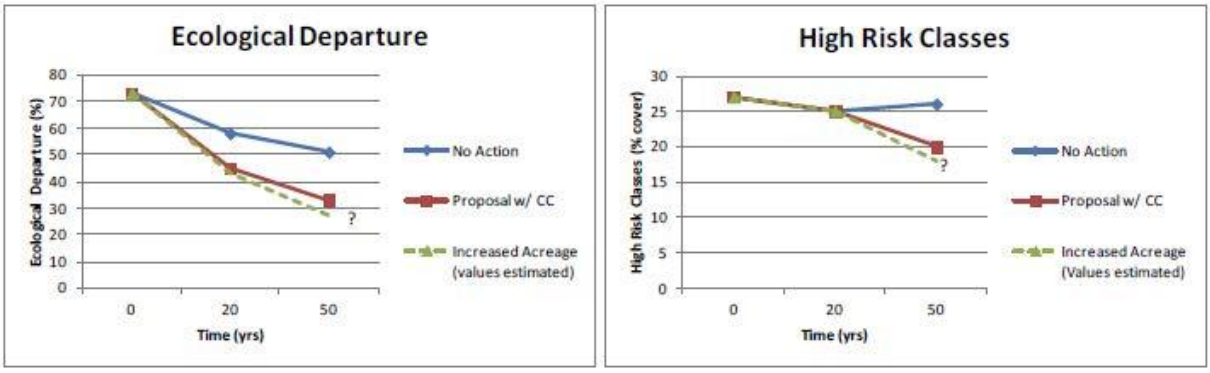
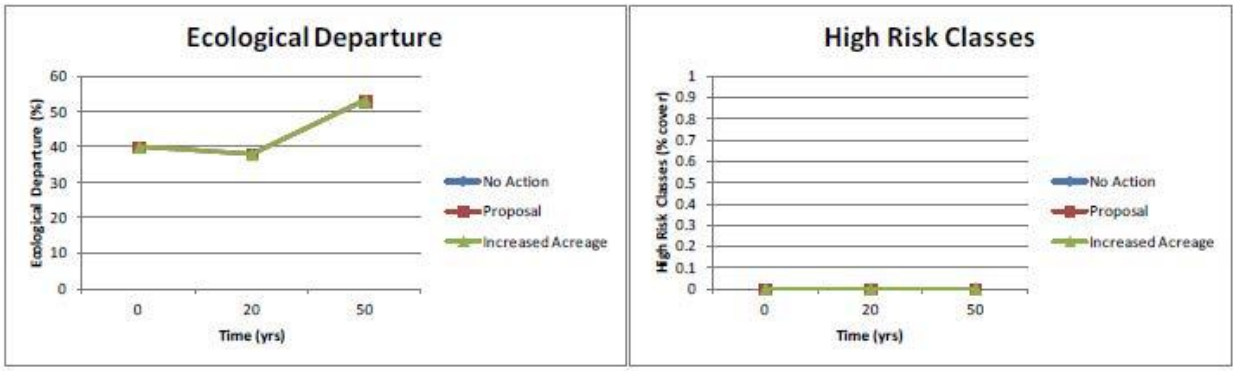
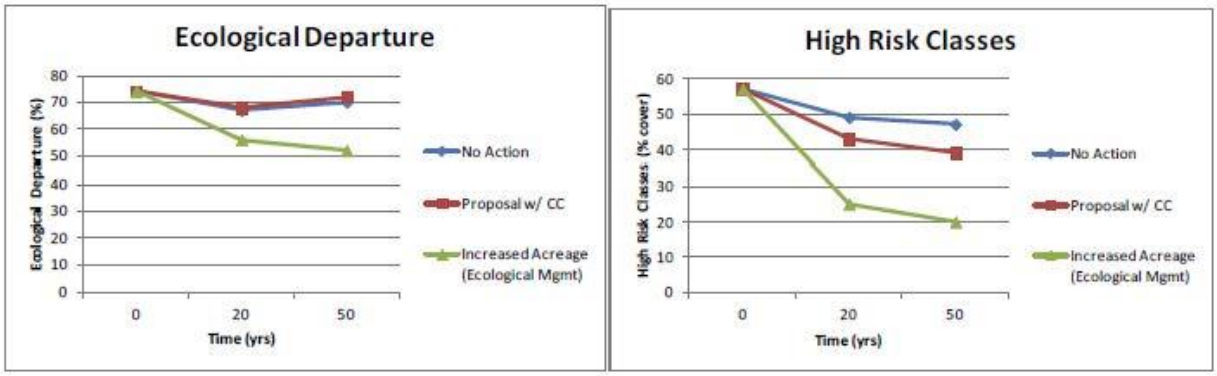


Figure 7. Ecological Departure and High Risk Classes: First set of Upland Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher et al 2009 report. Scenarios in the report are similar to Alternatives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

Mountain Shrub



Wyoming sagebrush – loamy



Wyoming sagebrush – sandy

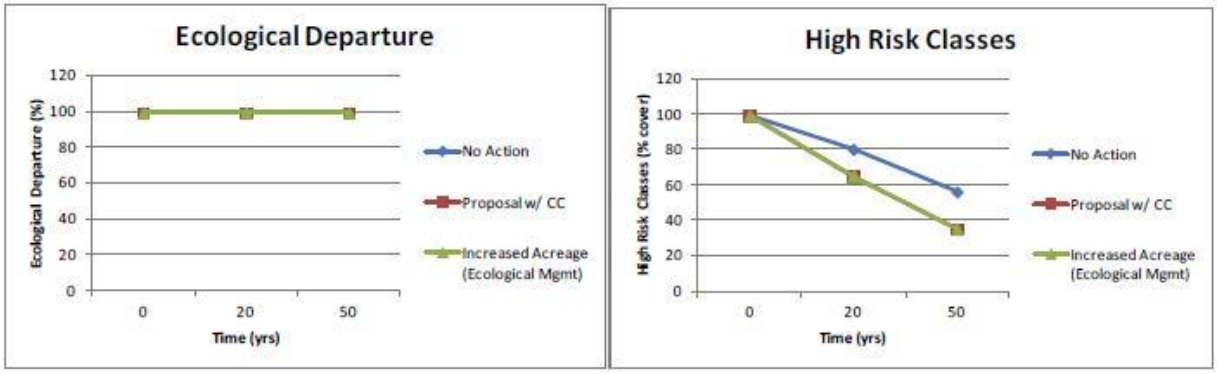
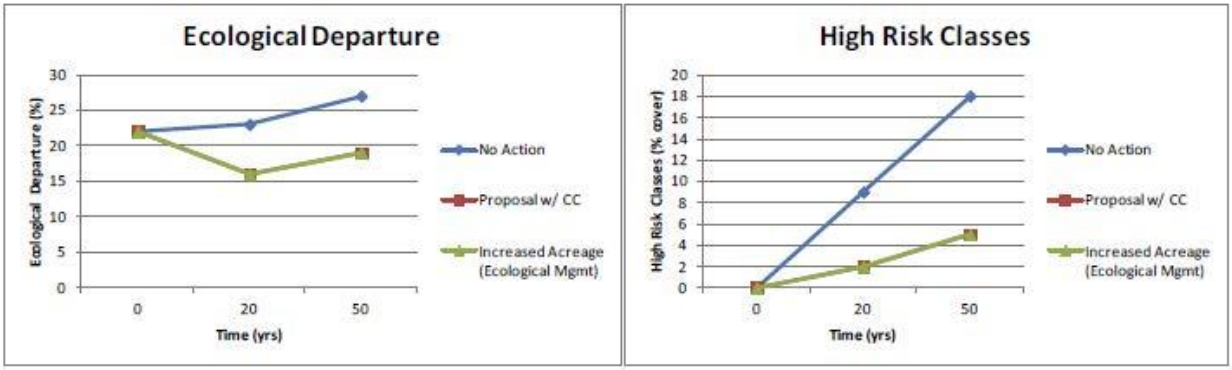


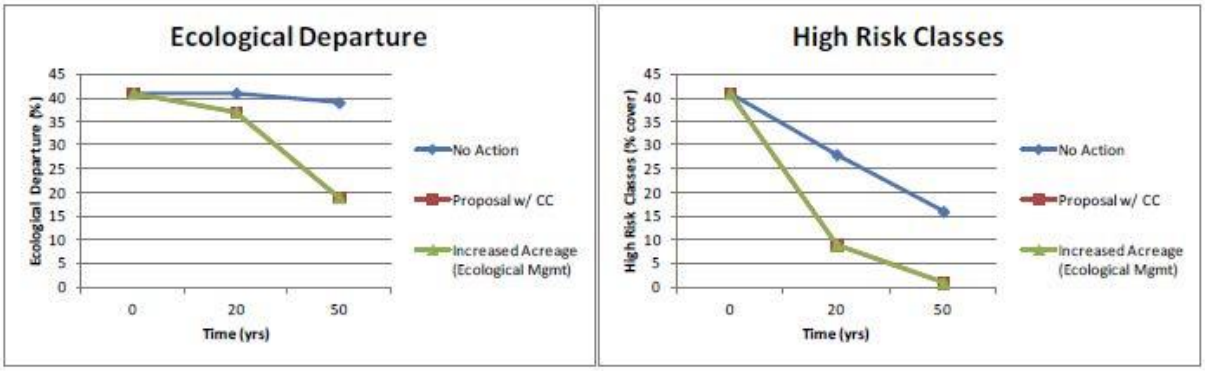
Figure 8. Ecological Departure and High Risk Classes: Second set of Upland Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher et al 2009 report. Scenarios in the report are similar to Alternatives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

Riparian types

Montane riparian



Stable aspen



Wet meadow

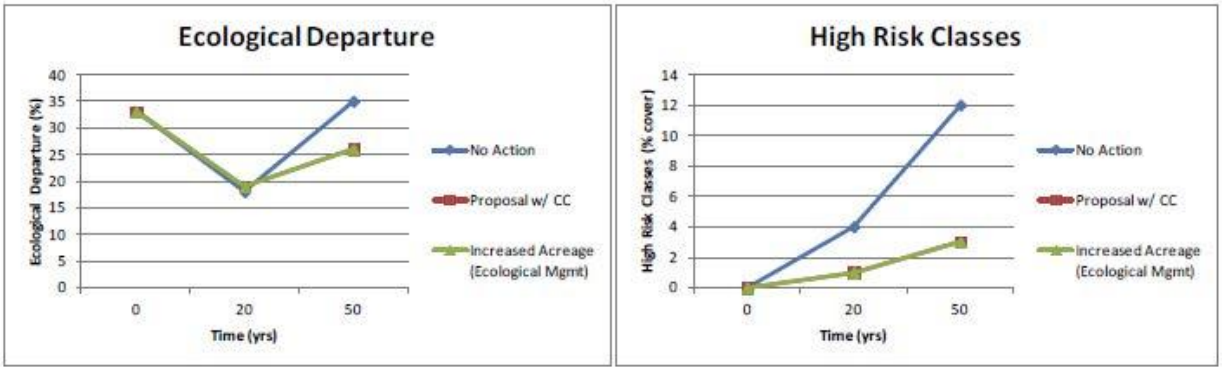


Figure 9. Ecological Departure and High Risk Classes: Riparian Types. Graphs show a comparison of Alternatives 1, 2 and 3 based on modeled changes in Ecological Departure and High Risk vegetation classes from the Provencher et al 2009 report. Scenarios in the report are similar to Alternatives 1-3 . 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-elevational 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 et al 2009.

Table 13. Estimated natural fire return intervals for the key ecological systems of the Bodie Hills based on the review of available scientific information and professional option gathered at the TNC workshops. See Provencher 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 in chapter 1 (pg.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. 2011).

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). The total acres burned were recorded at 1668 acres (an average of 61.8 acres per year). 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, pg.72).

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 allows 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 reburning. For example the 2004 Dana Fire reburned a portion of the 2002 Slinkard Fire. This would not have been expected to reburn 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 a 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. 2011). Cheatgrass conversion is more likely after high severity fires (Davies, Boyd et al. 2011). 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 on pg. 229).

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 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. 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 on pg. 229).

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 on pg. 229)

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 on pg. 229).

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 on pg. 229).

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

Quaternary Vegetation History of the Region

The species assemblage in the western Great Basin have largely been present in the region since the uplift of the Sierra Nevada in the Miocene (26 million years ago) which created a rain shadow that dominates the region to today. Species have moved up and down in the dramatic elevational gradients and north and south but have for the most part been present in the region throughout this long period (Nowak, Nowak et al. 1994).

The dominate species in the ecological systems that are the target of this proposal were all present in the area at the beginning end of the Pleistocene and the last glacial period about 12,000 years ago with the exception of pinyon pine (Nowak, Nowak et al. 1994). Today juniper is associated with pinyon pine 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, Nowak et al. 1994).

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, Nowak et al. 1994, 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 lead 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 (Intergovernmental Panel on Climate Change (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 and Lenihan et al.

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 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. 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 pg. 72). 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 pg. 102).

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 2) 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 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.

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 CNDDB (California Natural Diversity Database) 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.

  It is unknown how *A. johannis-howellii* responds to fire. The mean fire return interval can range between 40-80 years in Montane Sagebrush Steppe and over 200 years in Low Sage.

- *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. *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.

  Little is known about *A. oophorus* var. *lavinii* in the Bodies Hills, including how it responds to fire or other disturbances.

- *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.

  It is unknown how *A. pseudiodanthus* responds to fire but based on its 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.

- *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 USFS (United States Forest Service) lands in Mono County and Nevada, as well as in the Granite Mountains and in Sequoia and Kings Canyon National Parks.

  It is unknown how *B. bodiensis* responds to fire, however occurrences in openings of sagebrush or other shrubs may have historically experienced fire at intervals of every 40-80 years. The species may benefit from treatments that maintain openings in shrub vegetation. It is expected that *B. bodiensis* would occur within potential treatment units.

- *Calochortus excavatus* (Inyo mariposa)
  Perennial herb. The California Natural Diversity Database (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.

  The response of *C. quadricostata* to fire is unknown. It is unlikely that occurrences restricted to low sage habitats were historically exposed to fire at regular intervals; however occurrences that overlap with the Montane Sagebrush Steppe, Wyoming Sagebrush and Basin Wildrye – big sagebrush ecological systems may have been exposed to occasional low

intensity fire. The habitat of these later occurrences may benefit from disturbances such as fire. It is expected that *C. quadricostata* would occur within potential treatment units.

- *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. 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.

  The response of *E. alexanderae* to fire or other disturbances is unknown.

- *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 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.

  Due to *P. monoensis* occurring along road edges it has likely adapted to some level of disturbance and an earlier seral vegetation class. *P. monoensis* may respond positively to some forms of disturbances. There is potential for *P. monoensis* to occur within potential treatment units.

- *Polyctenium williamsiae* (William's combleaf):
  Perennial low growing herb. In the Bodie Hills *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.

  It is unknown how *P. williamsiae* responds to fire but based on its habitat it is unlikely that historically the species experienced regular fire. Because of the habitat where *P. williamsiae* occurs in the project area, it is unlikely to be included in the treatment areas.

- *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.

The response of *S. oliganthus* to fire or other disturbances is unknown. It is possible that *S. oliganthus* would occur within potential treatment units.

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 there may indirect impacts.

The Low Sage ecological system supports the majority of known Sensitive plant occurrences 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 13 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 in the absence of treatments 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 pg. 259 for description). Although the Montane Sagebrush ecological system will naturally progress towards a system with 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 would be larger and of higher intensity (see Issue 5) than what might occur under controlled burned settings. Under high intensity conditions it is more likely that Sensitive plants would be impacted due to being directly burned or from the adjacent habitat being burned.

Overall the long term trend for the ecological systems where many Sensitive plants occur in the Bodie Hills is for increased coverage of pinyon, shrubs species, and/or annual grasses. For Sensitive plants that utilize open, sparsely vegetated habitat, increases in native species such big sagebrush or pinyon could result in direct loss of habitat or higher intensity wildfires which could adversely impact Sensitive plants. Increases in annual grasses may also result in direct loss of habitat or increased wildfire frequency which could adversely impact Sensitive 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 the cumulative effects analysis area.

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 in. 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* would minimize 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. Historically the ecological systems where broadcast prescribed burning is proposed likely experienced periodic fire (every 40 to 80 years). Plants that live in those systems are likely to be somewhat adapted to fire. As indicated in the Design Features if it is determined that treatments are beneficial to a Sensitive plant species, that species would be considered for being included in future treatments.

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 mowing and hand cutting of pinyon trees or individual shrubs therefore direct adverse impacts (such as piling or burning directly on occurrences) to *C. quadricostata* or other Sensitive species in the Low Sage ecological system could easily be avoided.

It is expected that the Proposed Action treatments would indirectly benefit Sensitive plants or Sensitive plant habitats. 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 some 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 late seral sagebrush sites. 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. High intensity wildfires are more likely to result in a loss of a Sensitive plant seed bank and/or direct mortality of unground plant parts, both of which could prevent reestablishment of a Sensitive plant occurrence.

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. However the Methods, Method Selection Criteria and Design Features should minimize potential adverse effects. In the absence of treatments it is expected that wildfires will be larger in size and intensity. Without the ability to choose when and where a wildfire occurs, it is possible that a wildfire will have a greater, longer lasting adverse impact than that posed by the proposed treatments. Overall direct effects to Sensitive plants are expected to be minimal or none and indirect beneficial effects are expected to outweigh adverse effects because treatments are expected to improve the overall condition of ecological systems in the project area.

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 the acres treated. 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 has been found 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 road sides and other previously disturbed sites but it can also be found in other site types throughout the Bodie Hills. The Rangeland Health Assessments that were 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 (2012 California Invasive Plant Council). Increased abundance or coverage of cheatgrass cannot be attributed to a single factor but rather it is more likely to be 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 by the burn, may lead to an increase in cheatgrass distribution and abundance (D'Antonio and Vitousek 1992, Davis et al. 2000, Chambers et al. 2007, (Chambers 2004,

Whittaker 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 et al. 2000, Chambers et al. 2007, Chambers 2004, Whittaker et al. 2008). In general, it is believed that in the Bodie Hills, lower elevation and south facing slopes are more likely to be invaded or have increases in cheatgrass cover. The Wyoming Sagebrush ecological systems in the Bodie Hills 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 would be highly susceptible to cheatgrass invasion due the lack of existing understory vegetation (Davies et al. 2008, Whisenant 1990). A recent study documented that Wyoming sagebrush stands that are highly depleted of native understory are vulnerable to increases in cheatgrass with mowing treatments if no other management actions are taken (Davies, Bates et al. 2012).

Other ecological systems (or sites with the listed conditions) that may be more susceptible to invasion or an increase in cheatgrass include:

1. 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 et al. 2004, Brooks and Minnich 2006). Early and mid-seral vegetation tends to be more resistant to large fires because there is more interspaces between vegetation which limits the ability of fires to spread.
2. Sites which have greater "advanced stages" of pinyon encroachment (Baughman et al. 2010). Because of the higher fuels 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 # 3 below).
3. Sites with little or no perennial grasses and/or native forbs in the understory (Baughman et al. 2010). Both of the above conditions (# 1 & 2) could have sites with depleted understories. 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. See Issue 8 for more information.

4. Sites where cheatgrass is already present. Areas that are disturbed or have vegetation removed by wildfire, prescribed fire, mechanical treatments, etc. that have cheatgrass 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 would 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 would 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 et al. 2010).

In the absence of thoughtful active management that would create fuel breaks in or around uncharacteristic ecological systems and create a mosaic of vegetation with different age classes that are more resistant to large, high intensity fires, the Bodie Hills are at risk of experiencing high intensity wildfires that would likely lead to significant increases in cheatgrass abundance and distribution.

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 disturbance 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 of an invasive species not currently occurring 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 adverse on the distribution and abundance of invasive plants in the project area. Proposed treatments may increase the potential for invasive plant abundance and distribution; disturbances 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 et al. 2012, Whittaker et al. 2008, Chambers et al. 2007). For example, Ross et al. (2011) observed rings of cheatgrass within pile burn area. However, the methods, method selection criteria and design features of the Proposed Action are intended to reduce the potential for an increase in distribution and abundance of invasive plants. The Proposed Action would target areas that are less susceptible to cheatgrass invasion and be conducted in a manner that would decrease the likelihood for increasing invasive plant distribution or spread. Target areas for the Proposed Action 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). Even where shrub densities are high and a native understory is not abundant, researchers found that mowing montane sagebrush steppe resulted in increases in native understory cover but did not increase exotic annuals (Davies, Bates et al. 2012). 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 but there were no significant effects on cover (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.

As indicated in the Background and No Action alternative of this Issue, several of the ecological systems in the Bodie Hills are at risk of being adversely impacted by cheatgrass or other invasive plants that may incur following a wildfire. The goal of the Proposed Action is to create a more natural distribution of seral classes and reduce the potential of high risk vegetation classes. Vegetation that has swathes of land at different age classes is 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.

In ecological systems that already have high cover of cheatgrass such as Wyoming sagebrush - loamy, the treatments will be focused on creating fuel breaks to help prevent wildfires and seeding of native perennials which may help prevent cheatgrass dominance. Even if the fuelbreaks themselves have increased cheatgrass they should help protect the rest of the ecological system from wildfire. Therefore it is expected that treatments in all ecological systems associated with the Proposed Action would reduce the potential for future conditions that would facilitate the increase of invasive plant distribution and spread in the Bodie Hills.

Overall, the effects of the Proposed Action are expected to be beneficial compared to the No Action alternative. Beneficial effects associated with the Proposed Action are expected to out-weigh potential adverse effects in the long term by reducing the potential increase of invasive plants associated with wildfires that may occur in the current (No Action alternative) condition of the Bodie Hills.

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 morality 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 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. Perennial forbs as well as native annual plants are also expected to increase following treatment, although their response tends to be 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 perennial grass and forb cover and density, as has been observed in similar projects throughout the Great Basin (Cook et al. 1994, Bates et al. 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 (cited in Ross et al 2011). 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.

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. 2001). Ross et al. cited cases where adding mulch to these sites helped reduce cheatgrass abundance as well helped to stabilize the soil.

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. No other BLM

sensitive wildlife species are known to occur in the project area based on historical records, field monitoring, and/or habitat suitability.

Greater Sage-grouse

Status

The greater sage-grouse is a candidate for protection under the Endangered Species Act and is designated as a BLM sensitive species. Greater sage-grouse are a species of concern in the project area due to rangewide declines (Connelly et al. 2000, USDI 2010b) and due to 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 2010b). 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 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 2010b). These habitat based threats include habitat loss caused by development, grazing, invasive species, conifer encroachment, and wildfire (USDI 2010b). In 2012, the Bi-State DPS specifically was designated as a BLM sensitive species (USDI BLM 2012). 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 Area. Sage-grouse population trends in the Bodie PMU as indicated by annual lek (strutting ground) censuses are characterized by frequent fluctuations. The highest numbers were recorded during the early 1960s, the early 1990s, and present day. The lowest numbers were recorded during the mid-1950s, and early 1980s. 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 Game (CDFG). 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. From 2004 to 2009, the number of strutting males was near the long-term average at 90 to 115% of LTA (Ibid). In most recent years (2010-2011), 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 (CDFG lek count records 2012). 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).

Connelly et al. (2004) noted that in California, “available data do not provide any evidence of a long-term population decline, but instead suggest widely fluctuating but perhaps relatively stable to increasing populations.” More recent published data describes the Mono Lake population (which occurs in the project area) as having seen irregular fluctuation between peaks and lows, with 35% declines during some periods (Garton et al. 2011). However, despite these apparent

declines, Garton concluded that in the Mono Lake population that there is no consistent long-term trend for a 40 year period (Garton et al. 2011). Lek counts suggest that greater sage-grouse populations in Long Valley, and to a lesser degree Bodie Hills, have been relatively stable over the past 15 years (USDI 2010b).

Habitat

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.

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 (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). 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. 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, BIFO personnel observations 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 and compares favorably to that reported elsewhere in sage-grouse range (Kolada 2009a). Nesting habitat quality or quantity is not considered to be a limiting factor for greater sage-grouse in the Bodie PMU.

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 (BLM 2003, USGS unpublished data, CDFG unpublished data). As a result, many grouse tend to concentrate in and around high elevation or mesic habitats during the summer. Many of these mesic habitats are privately owned by grazing permittees. An apparently smaller number of grouse remain near water sources at lower elevations or move westward across Highway 395 to the east slope of the Sierra.

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 grouse habitat using the radio telemetry locations of grouse, known leks, and vegetation characteristics (Bi-State Technical Advisory Committee 2012b). The PPH was split into two categories, resources

selection function (RSF) and utilization distribution (UD) (Ibid). The RSF models habitat suitability to predict what habitat the sage-grouse will use. The second category is Utilization Distribution (UD) which represents areas the grouse are likely to occur in relation to active lek sites. In the project area on BLM lands, there are approximately 114,304 acres of RSF PPH and 20,281 acres of UD PPH. Therefore, based on this model, 81% of the BLM lands in the Project Area are PPH. This model reinforces that the Bodie Hills are high quality habitat for sage-grouse.

Threats

The Bi-State Technical Advisory Committee (2012a) ranked the risks to grouse in the Bodie PMU. Wildfire and pinyon-juniper encroachment were ranked the highest threats to the birds in this PMU, relative to other risks (Ibid). Wildfire can result in landscape scale changes in grouse habitat and could therefore result in negative impacts to grouse (Ibid). Pinyon-juniper expansion is occurring adjacent to important 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).

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. 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). 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 encroachment 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. The No Action alternative, by not treating these encroaching trees, continues this trend of gradual loss and degradation of habitat.

Available data indicates that a relative paucity 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. 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 encroachment, 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.

Grazing can remove grasses that provide habitat for insects that grouse consume. It is not likely that future grazing will be a major impact on grouse in the project area as grazing is not thought to be a primary threat to grouse in the Bi-State DPS (USDI 2010b, Bi-State Technical Advisory Committee 2012a). Additionally, there are no changes in grazing management that are reasonably foreseeable (described in Issue 1). 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 form pinyon-juniper encroachment, 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.”

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 (2010b) considered hunting a

relatively low risk; 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. The FWS concluded that because the hunting is so limited, it does not appear that hunting is restricting population growth in the Bi-State DPS. Finally, the FWS state that based on their review of the best scientific and commercial data available, overutilization (which includes hunting), is not a significant threat to the Bi-State DPS of the greater sage-grouse. 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, there will continue to be limited early seral stages in sagebrush ecological types, which may be limiting population numbers.

Alternative 2. Proposed Action

Direct and Indirect Effects

Potential direct and indirect impacts to grouse from project activities include being flushed from the area during mechanical treatments and burning, loss of habitat and loss of connectivity to areas of use.

Sage-grouse are widespread across ecological types in the project area, therefore a variety of treatments could occur in grouse habitats. The project is designed to be beneficial to grouse by improving habitat conditions. Project design features limit impacts to grouse and their habitat as recommended by Connelly et al. (2000). The design features also maximize the benefit to grouse by targeting treatments in areas most favorable to improve habitat for grouse. Treatments are expected to be adaptive, therefore if a treatment is unsuccessful it can be altered or if it is successful it can be used elsewhere in the project area.

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, this amount of treatment will provide a benefit to the ecological systems but treatment of a larger number of acres would provide a better long term benefit. Treatment is expected to benefit sage-grouse, through improved habitat diversity and reduced wildfire risk.

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

In the long term, 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 grouse (Miller and Eddleman 2000). Fire can also break up a homogenous sagebrush landscape and move conditions to earlier seral stages. This is important for grouse, as the lack of these early stages may be limiting grouse populations in the Bodie Hills. Prescribed fire can break up fuel loads, thus reducing the risk of a larger or more intense fire in the future (Crawford et al. 2004). Prescribed fire would only be used when potential for cheatgrass conversion is low. It would also be used in primarily small areas (less than 124 acres where possible) as recommended for grouse by Connelly et. al (2000). Cheatgrass conversion is a potential threat from this treatment, but because prescribed fire would be used in small areas and treatments would be monitored and adapted if they were unsuccessful.

Mechanical treatment of sagebrush

Similar to the use of prescribed fire, mechanical treatments such as mowing can break up a homogenous sagebrush landscape and create a mosaic of different seral stages. This can benefit grouse by increasing the availability of forbs and the diversity of seral stages (Dahlgren et al. 2006). It can also benefit grouse by reducing risk or intensity of wildfire. Treatments would occur in small patches such that there is good edge and cover habitat for grouse and a sufficient seed source to populate the created patches.

Conifer removal

As discussed in the No Action alternative, removal of conifer would be beneficial to sage-grouse in the long-term. Water used by conifers would be available to sagebrush, grasses and forbs necessary for grouse forage and cover. Perches for grouse predators would be reduced. Wildfire risk would be decreased with a decrease in fuel loading.

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.

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 encroachment) 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 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 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 in active pygmy rabbit burrow complexes. 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.

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 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. In the Bodie Hills, pikas are also 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 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 2010a). The most 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).

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 2010a). Additionally, after extensive survey efforts, Millar et al. (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 encroachment into sagebrush or meadows, already at levels outside the natural range of variability, may increase. Conifer encroachment 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 2010a).

Cumulative effects

Historic mining is the primary cumulative effect operating on pika populations as this mining created the existing occupied habitat. No known proposals exist at this time for future mining. However, if a specific proposal is submitted, the NEPA analysis will address the potential effects on pika. The FWS (USDI 2010a) 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 pika 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 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 encroachment 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 encroachment, 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 encroachment. 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 addition to potentially improving the quality of the habitat, thinning the conifers and brush in the treatment areas will reduce the risk of catastrophic fire 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.

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 catastrophic fire. 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. 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 (Bishop FO 1978-1979).

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. 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 (Bishop Field office project files).

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.

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.

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 Basin Watershed Assessment, March 2007). The East Walker River watershed encompasses 586 square miles (375,040 acres) in both California and Nevada (Walker River Chronology, January 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).

Mono Lake and East Walker River Watersheds and Drainage Divide of the Bodie Hills Proposed Project Area

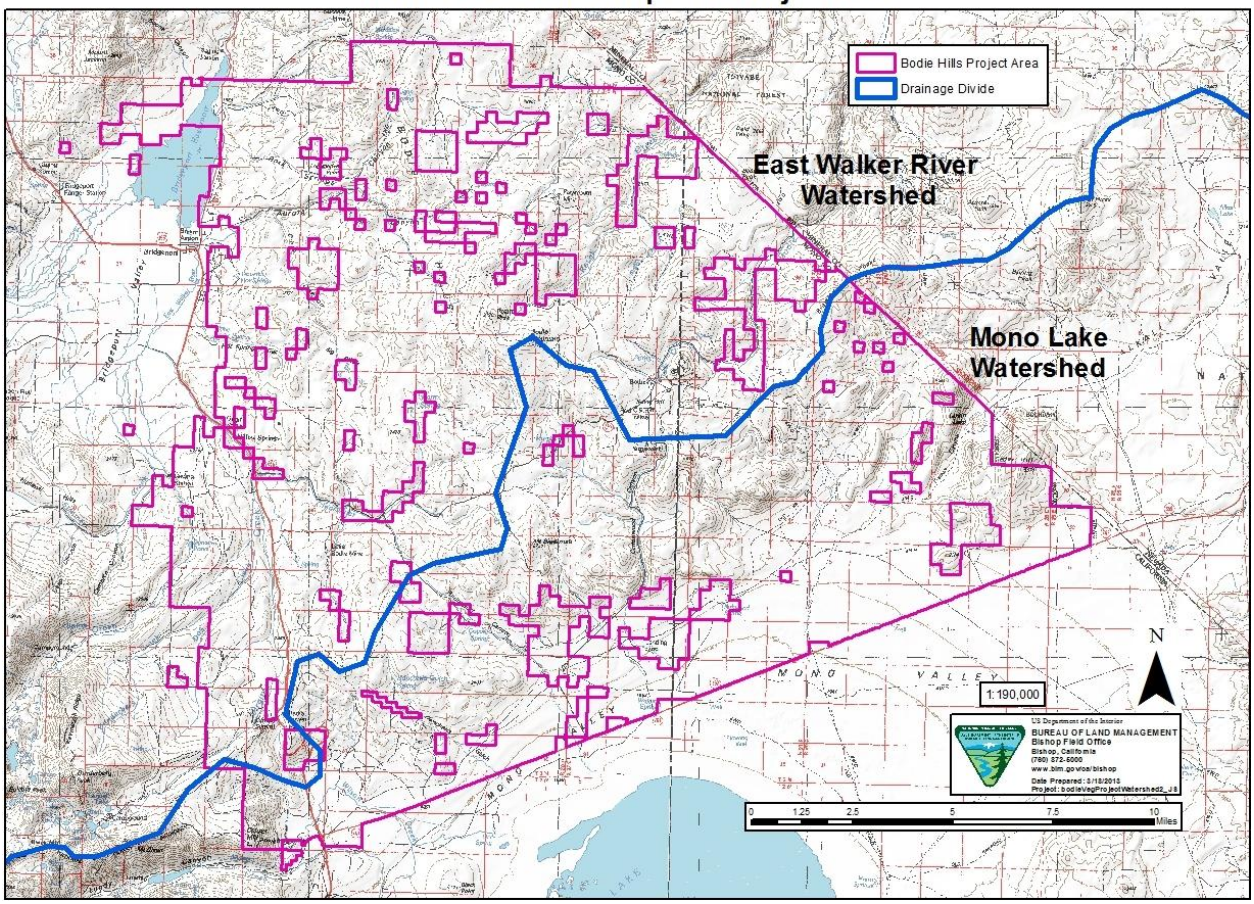


Figure 10. Watershed divide in the Bodie Hills project area between Mono Lake and East Walk River.

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. Several 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 extra carbon sequestered by pinyon and juniper expansion is very likely to be lost in wildfires with the predicted increases in wildfire size and severity (see Issue 5). Severe wildfires in combination with invasive annual grasses will actually result in plant communities with lower stored carbon.

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 is most likely 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 (California Environmental Protection Agency 2009). 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 (Great Basin Unified Air Pollution Control District 1995). 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 (California Environmental Protection Agency 2009). 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 14. Estimated annual rate of PM-10 emissions from broadcast burning. 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 15. Estimate of the maximum emissions from pile burning on an annual basis. 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 16. Estimated annual rate of PM-10 emissions from broadcast burning. 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 17. Estimate of the maximum emissions from pile burning on an annual basis. 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 18. Estimated annual rate of PM-10 emissions from broadcast burning. 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 19. Estimate of the maximum emissions from pile burning on an annual basis. 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 20. Estimated annual rate of PM-10 emissions from broadcast burning. 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 21. Estimate of the maximum emissions from pile burning on an annual basis. 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 22. Estimated annual rate of PM-10 emissions from broadcast burning. 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 23. Estimate of the maximum emissions from pile burning on an annual basis. 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 (BLM 1993). 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 (BLM 2012 Fire Patrol Data).

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 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.

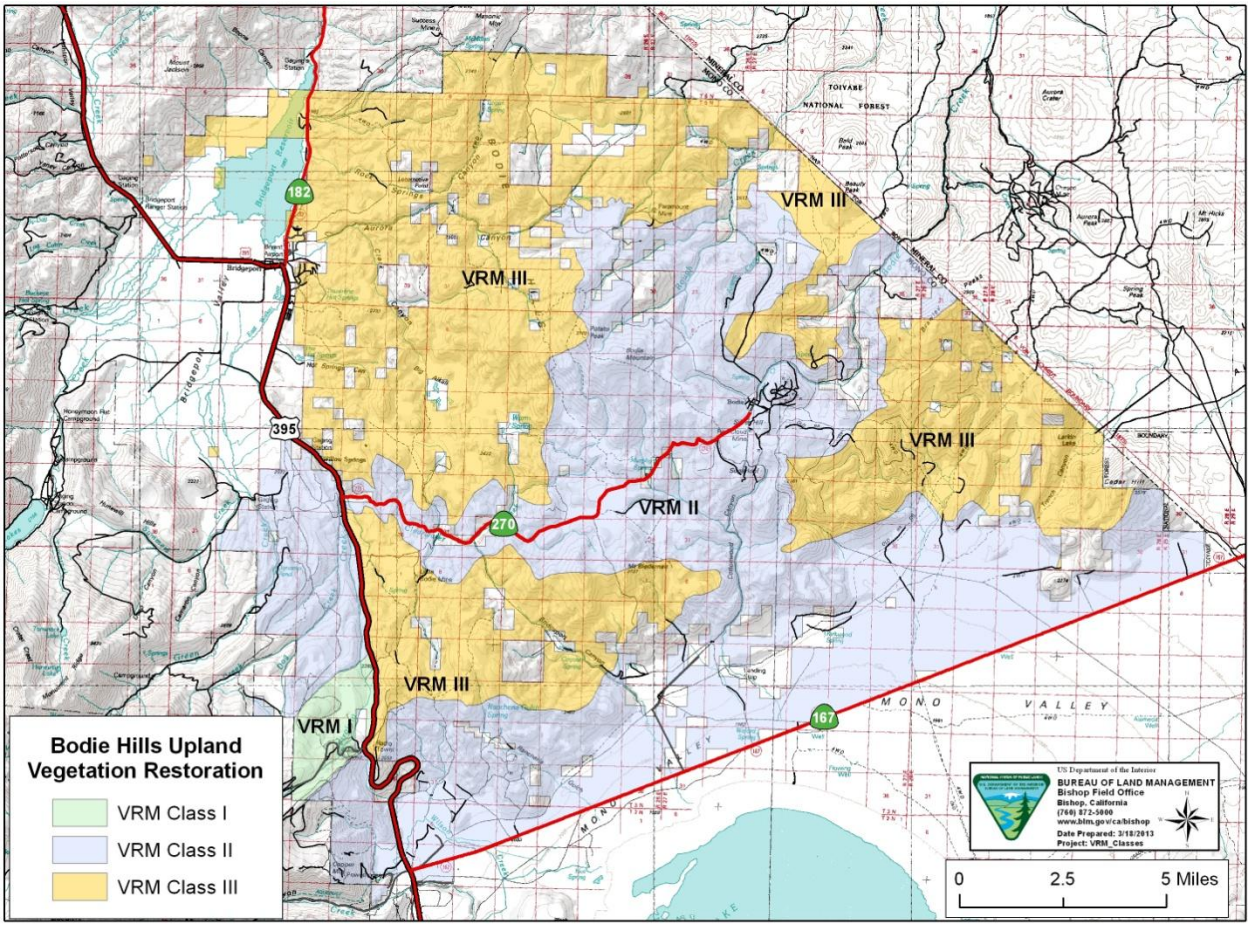


Figure 11. Visual Resource Management Classes (VRM) for the project area as defined by the Bishop RMP.

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 beginning on pg. 33.

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).

Visual Impacts of the eight vegetation treatment methods within the general landscape:

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: 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: The same area 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: Mowing treatments in the foreground, 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 Fish and Game. 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. 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 recognized 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. 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). 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. 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. 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. 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 *Phacelia monoensis*, greater sage-grouse habitat, mule deer and pronghorn 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. 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:

> *<u>f. Protect or enhance wilderness characteristics or values</u>. 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 supports 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. *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 being based on "landscape assessments that identify historical range of variability, current condition, restoration targets, and cumulative effects of management" (1.6.D.8.b.iii.D,E,F). The TNC analysis provides the basis for these information requirements.

Rationale for consistency with BLM WSA Management Policy
The analysis of Issue 1 documents the ecological departure in the Bodie Hills and how the Proposed Action would help move the system towards a condition where the natural processes can function. 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.

Prescribed burning would be 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 on page 31. 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 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 (BLM 2012 Fire Patrol Data).

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.)

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. 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.

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.

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).

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.

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 on page 229. 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 (pg.7). 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.

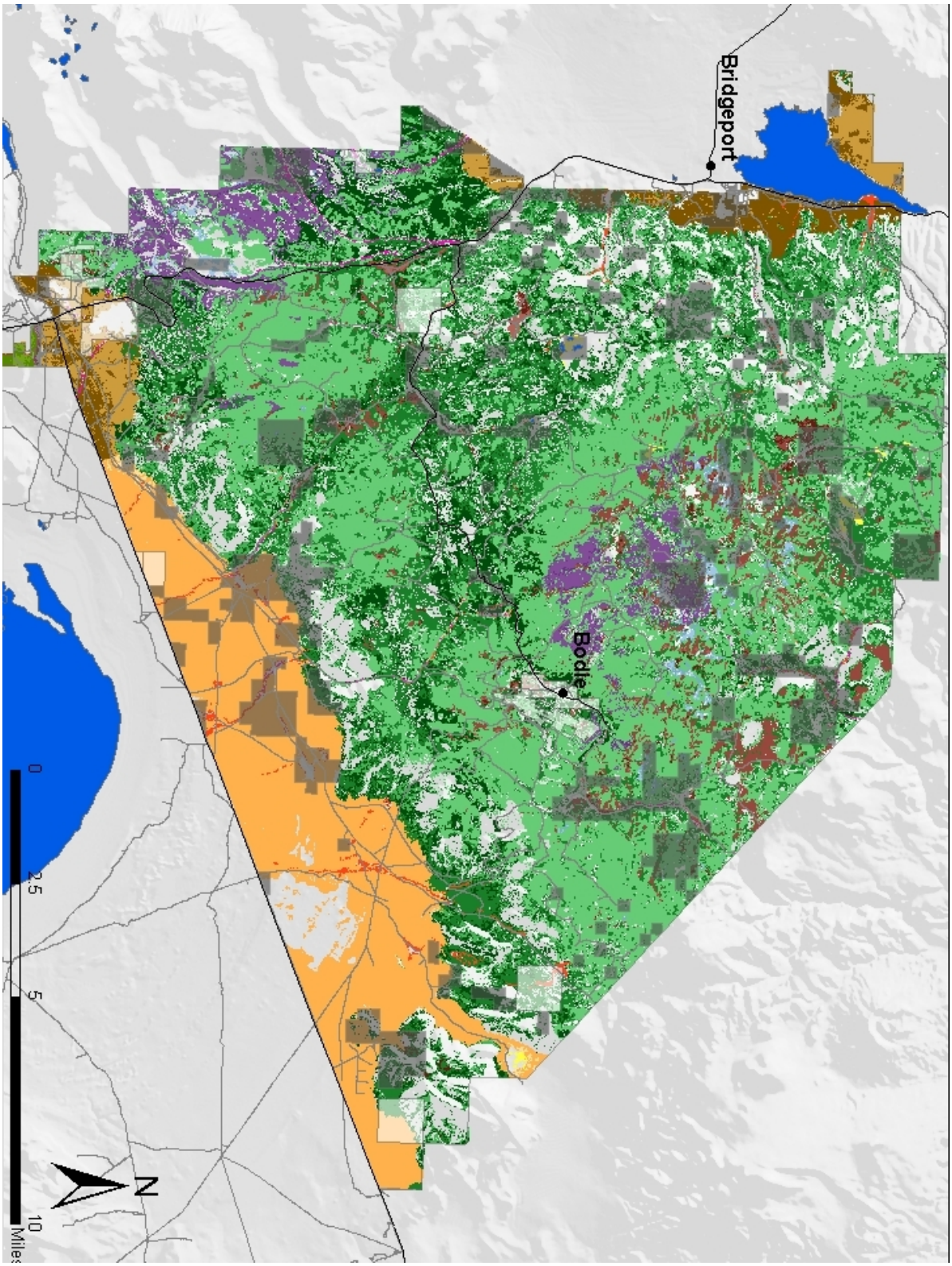


Figure 16: Target ecological systems and states for treatment as mapped in 2007. Provided for reference only. Mapping classification has a certain error rate and conditions will change, so the vegetation state on the ground will determine eligibility for treatment.

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 Chapter 1 on pg. 8. 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. 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 on pg. 246).

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 1995).

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 Piag 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, 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 Kuzedikaa, who subsisted largely on pinyon nuts during the winter. The clearing of Jeffrey Pine in the Mono Mills likely affected the Kuzedikaa ability to harvest Piaga caterpillar, another food source for the Kuzedikaa (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 28,000 acres and generated a total of 51 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.

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, 1993b).

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 on pg. 229 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 and Halford (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.

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 (Bishop Field Office 1978-1979). Several streams were also tested for water quality three times in 1984 and twice in 1985 BLM Bishop Field Office 1986a). In 1986, the BLM conducted an inventory of water source condition and water quality on most natural springs (BLM Bishop Field Office 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 (BLM Bishop Field Office stream files).

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 (BLM Bishop Field Office stream files).

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 (BLM Bishop Field Office stream files).

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 (BLM Bishop FO stream files).

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 (BLM Bishop Field Office stream files). 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 Basin Watershed Assessment, March 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 (BLM Bishop Field Office stream files).

For the Bodie Hills Project Area, the BIFO has on file approximately 200 recorded sites on springs and seeps (BLM Bishop Field Office spring files). 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.) (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 (Bishop Field Office 1994). 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. Stream assessments were performed to determine Proper Functioning Condition (1994) 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.

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 (Bishop Field Office 1978-79), and extensive and intensive stream monitoring conducted originally in 1988 and repeated once or more in subsequent years for stream reaches potentially undergoing change (Bishop Field Office 1988-1994). 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.

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) and Environmental Impact Statement (EIS) (US Department of Interior, BLM, 1993). 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. 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).

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). 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. 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 candidate 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 (pg. 202). Effects to wilderness character outside of WSAs are analyzed in Issue 21 (pg. 217). Effects to visual resources are analyzed in Issue 18 (pg. 189).