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Forest Service

Restoration of Fire Adapted Ecosystems

Environmental Assessment

**Lake Tahoe Basin Management Unit
Pacific Southwest Region
El Dorado County, California**

January 2015

**Baldwin Meadow (T13N, R17E, Sec 26, Emerald Bay Quad)
Benwood Meadow (T11N, R18E, Sec 18, Echo Lake Quad)
Freel Meadow (T11N, R18E, Sec 11 and 12, Freel Peak Quad)
Hellhole Meadow (T11N, R18E, Sec 1, Freel Peak Quad)
Meiss Meadow (T10N, R17E, Sec 9, Caples Lake Quad)
Star Meadow (T12N, R19E, Sec 30, South Lake Tahoe Quad)**

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Chapter 1: Introduction

The Forest Service has prepared this environmental assessment in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This environmental assessment discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The document is organized as follows:

- **Chapter 1, “Introduction,”** includes information on the structure of the EA, background of the project, overview of the existing condition, the desired conditions, the purpose of and need for action, applicable management direction, and the decision framework. This chapter also describes how the Forest Service informed the public of the proposal through public involvement, describes the issues identified by the public, and summarizes laws, regulations, and policies that are applicable to the proposed project.
- **Chapter 2, “Alternatives, Including the Proposed Action,”** provides descriptions of the no-action alternative, and the Forest Service’s proposed action. It also summarizes the effects of the no-action alternative and the proposed action.
- **Chapter 3, “Affected Environment and Environmental Consequences,”** presents an overview of the analysis, the indicators used to document the effects, the existing conditions, and the environmental effects of implementing the proposed action and no-action alternative, and possible mitigation. The effects of the no-action alternative are described first to provide a baseline for evaluation and comparison of the proposed action.
- **Chapter 4, “Consultation and Coordination,”** provides a list of preparers and agencies consulted during the development of this document.
- The **appendices** provide best management practices, a non-native invasive plant risk assessment, riparian conservation objective analysis, and Limited Operating Periods (LOPs) for terrestrial wildlife species.

Additional documentation may be found in the project record located at the Lake Tahoe Basin Management Unit (LTBMU) Forest Supervisor’s Office in South Lake Tahoe, CA.

Background

Sierra Nevada meadows are groundwater dependent ecosystems that rely on the persistence of a shallow water table, generally at a depth of less than 3.5 feet throughout the growing season (Wood 1975, Ratliff 1985, Lowry et al. 2011, Weixelman et al. 2011). Meadows are composed of one or more herbaceous dominated plant communities (Weixelman et al. 2011). Woody vegetation is often present in meadows, but is not dominant (Weixelman et al. 2011).

In the Lake Tahoe Basin (LTB), meadow vegetation occurs at elevations ranging from lake level to almost 10,000 feet. Meadow vegetation includes grasses, sedges, rushes and flowering plant cover, with or without a shrub component. Although meadows account for a small percentage of the overall Lake Tahoe Basin Management Unit (LTBMU) landscape, they are of great ecological importance. Meadows in the LTBMU are limited and play a crucial role in hydrologic processes, erosion control, nutrient cycling, and habitat for many plant and animal species.

Meadows are usually classified based on vegetation, elevation, water table, landform, hydrology, and soil characteristics (Ratliff 1985, Potter 2006, Weixelman et al. 2011). Water table level and seasonal water table patterns are the most important factors determining the distribution of meadow vegetation, but meadow size and composition is further affected by climate, fire, and grazing by animals. In the LTB, dry

meadows are found on floodplains or drainage ways and at the dry edges of stream terraces. This type of meadow is moist in the early growing season and dry as the season progresses. Moist meadows are also found on floodplains or drainage ways and stream terraces, but these sites are wet to moist throughout the growing season in most years. Wet meadows are found on sites that have water-saturated soils within 20 inches of the surface for most of the year. Fens are wet meadows that occur in highly organic soils where the water table is at the soil surface for most of the year (Fites-Kaufman et al. 2007, Weixelman 2011a).

Between 2000 and 2011, a total of 66 plots in 37 meadows across the Lake Tahoe Basin were established. The objective of these plots was to assess the current status of meadows in the LTB and to conduct long term monitoring of meadow health to assist in the identification of management actions. Meadow plots were established following the Forest Service Region 5 range monitoring protocol (Weixelman 2011b). Meadows were stratified to capture a range of elevation and aspect using ArcGIS and to monitor effectiveness of stream channel and meadow restoration projects. These plots helped inform meadow selection for this project.

The intent of the proposed project is to restore ecological and hydrological characteristics of six meadows using a combination of conifer removal, prescribed fire, repair of head cuts, and planting of willows, and re-routing of trails that are influencing meadow hydrology. The intent is that this project work will prepare these systems for natural disturbances in the future. Meadows selected for restoration include (Figure 1-1):

Baldwin Meadow (T13N, R17E, Sec 26, Emerald Bay Quad)
Benwood Meadow (T11N, R18E, Sec 18, Echo Lake Quad)
Freel Meadow (T11N, R18E, Sec 11 and 12, Freel Peak Quad)
Hellhole Meadow (T11N, R18E, Sec 1, Freel Peak Quad)
Meiss Meadow (T10N, R17E, Sec 9, Caples Lake Quad)
Star Meadow (T12N, R19E, Sec 30, South Lake Tahoe Quad)

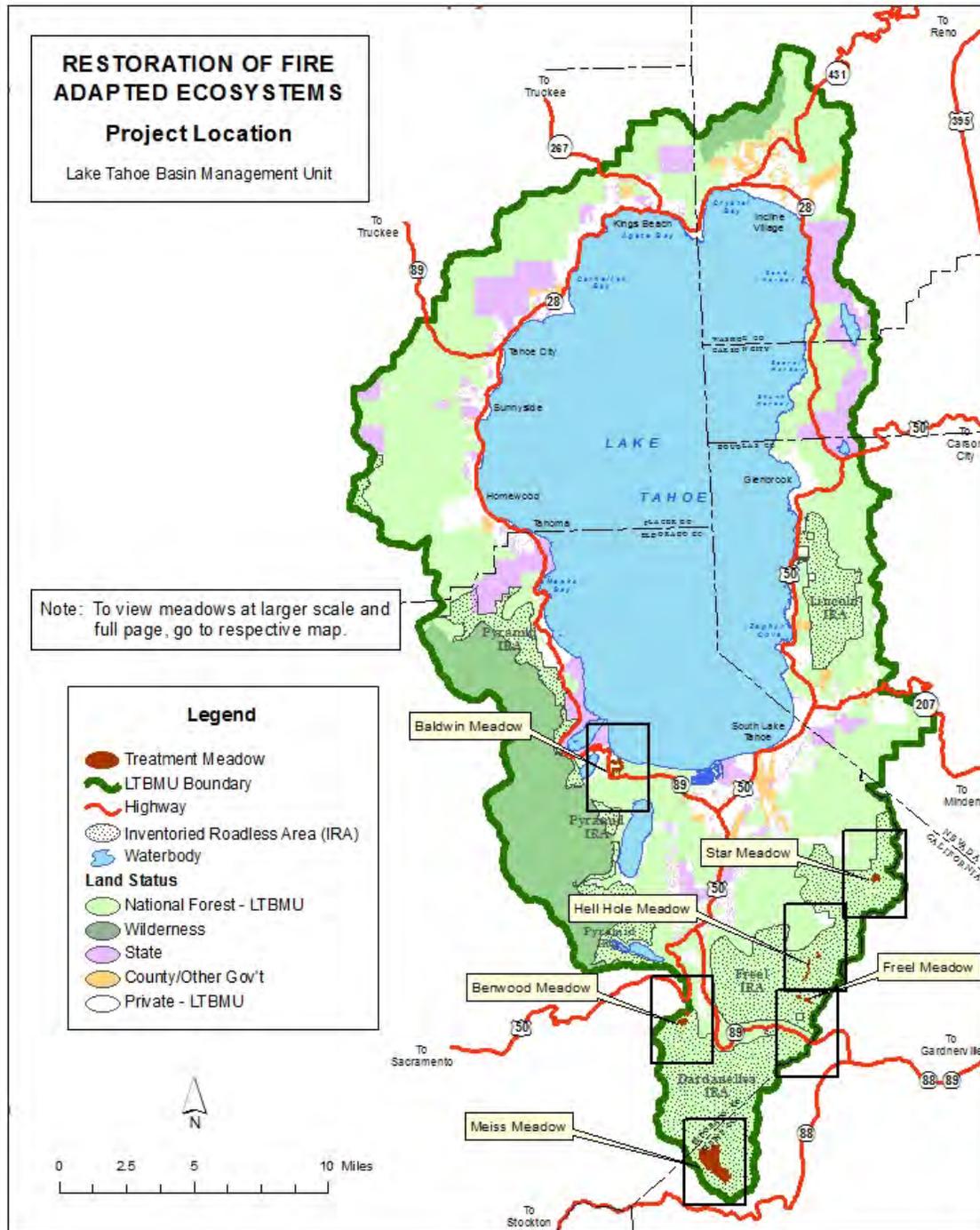


Figure 1-1: Project Location.

Existing Condition

Montane meadows have been identified among the most vulnerable and impacted habitat types of the Sierra Nevada (Kattelman and Embury 1996), and the Tahoe Regional Planning Agency (TRPA 2002) has identified meadow ecosystems as an important focus area for restoration efforts in the LTB. The processes that control the natural range of variability (NRV) within meadows have been altered. Past land

use and recurrent droughts have impaired the natural function and processes of many meadows in the LTB. There are approximately 4,700 acres of meadow habitat in the LTB, approximately 2,700 acres of which are managed by the Forest Service. In combination, the following impacts have interacted to produce complex effects on meadow function, composition, and structure:

Fire: Fire is a natural occurrence in the vegetation surrounding meadows and although relatively infrequent can also burn within meadow boundaries. Meadows can act as a fire break or as a corridor for fire spread, depending on the conditions (Dwire and Kauffman 2003, Pettit and Naiman 2007). When the surrounding forest is dense with high amounts of fuel, the meadows may no longer serve as a natural fuel break (Dwire and Kauffman 2003). Data suggests frequent low severity fires occurring within meadows and higher severity fires occurring about every 250-300 years. Due to fire suppression activities, the fire return interval has decreased compared to pre-settlement times. However, the time when fires are burning in meadows has been extended due to human caused ignitions (Gross and Coppoletta 2013).

Fire suppression activities have likely changed the frequency of fire in all six of the meadows selected for restoration under this project. In addition, suppression activities have increased the density of conifers at the meadow boundary.

Grazing: The introduction of domestic sheep, horses and cattle to the Sierra Nevada in the mid-1800s increased the grazing intensity and utilization of meadows beyond the NRV. Prior to domestic grazing, the meadows were grazed at low to moderate intensity by a small suite of native animals, which differed significantly from domestic livestock in both their foraging and habitat use patterns. Continued trampling of vegetation by livestock both within heavily grazed meadow areas and in stock crossing or livestock trails leads to a reduction in overall vegetation and increases the amount of bare soil. Higher densities of livestock have been shown to have a negative impact on forage abundance (Westoby 1985, Hobbs 1996). Domestic livestock congregate for long periods of time in specific areas (Loft et al. 1991, Kie and Boroski 1996). Moderate to heavy cattle grazing in Sierra Nevada meadows has been linked to reductions in deer forage and hiding cover in willow stands, particularly in late summer or during years of low precipitation (Loft et al. 1987, Loft et al. 1991, Kie 1996). Some native grazing animals, such as mule deer, continue to use meadows in the Sierra Nevada; however, their foraging patterns have been altered, resulting in decreased utilization of meadows with moderate to high livestock use (Loft et al. 1991, Loomis et al. 1991, Dull 1999).

The LTBMU has managed four grazing allotments in five of the six meadows since as early as 1965 (Appendix F); however, these meadows have a grazing history that predates these records. These meadows, and others around the basin, have been influenced by grazing activities for over 150 years with the most intensive impacts occurring between 1920 and 1930 (USDA 2000). With no restrictions on grazing, records indicate that shepherds grazed their livestock in wet meadows, often too early in the season (USDA, 2000). In an effort to control overuse, grazing in the LTB was limited to allotments assigned to individual permittees in the 1930s, which also regulated the timing and location of herds (Elliot-Fisk et al. 1996). Three of the allotments are currently vacant and one has been closed (Baldwin).

Hydrologic Changes/Stream Incision: The hydrologic conditions of Sierra meadows represent a continuum of wet meadows to dry meadows. Both local and watershed scale hydrologic processes influence meadow site conditions (Lowry et al. 2011). Variability in the movement of water within a meadow's contributing watershed has been shown to significantly affect groundwater levels within the meadow (Lowry et al. 2011). Climate change (de Valpine and Harte 2001), changes in channel morphology (Loheide and Gorelick 2007), and cumulative watershed impacts due to land use practices (Patterson and Cooper 2007) all influence meadow hydrology.

Stream incision is the unnatural deepening of the streambed in a stream channel. It results from persistent increases in the rate of stream flow in a specific stream location. Such persistent increases are often caused by changes to the stream channel that shorten or steepen its path, or that remove roughness character (e.g., vegetation, woody debris) from the stream channel and floodplains that would have otherwise slowed water flow. Stream incision affects meadow hydrology by changing the patterns of both floodwaters and groundwater flows. Changes in these patterns ultimately leads to a decrease in meadow moisture (Loheide and Gorelick 2007). In undamaged [natural] settings, floodwaters frequently fill stream channels and spread water out onto the adjacent floodplains or meadows. Here the groundwater table is found at a shallow depth below the land surface and sustains the floodplain vegetation. By contrast, damaged (incised) stream channels are rarely completely filled by floodwaters, and so little (if any) water spreads onto adjacent floodplains or meadows. Here the groundwater table lies below the root zone of vegetation in floodplains or meadows adjacent to incised streams and the vegetation cannot be sustained by groundwater.

Channel incision lowers groundwater and reduces overland flow frequencies (Micheli and Kirchner 2002). Evidence of channel incision includes: high cut banks, a channel cross-section that exceeds the capacity to carry the mean annual flood (Micheli and Kirchner 2002), or a widened channel that causes a decrease in duration of seasonal flows (Norton et al. 2011). Channel incision reduces bank stability by increasing the bank height and encouraging the conversion of wetland vegetation to dry meadow vegetation (Micheli and Kirchner 2002). Disruptions to the hydrologic regime, in combination with changes in climate have likely decreased the abundance of wetland plant species.

Some of the meadow complexes in the LTBMU are at risk of drying out due to channel incision and adjacent land uses that influence water patterns and retention. Channels occur in each of the meadows selected under this project. Incision varies by meadow, with the most obvious head cut occurring at Freel Meadow.

Conifer Encroachment: Lodgepole pine (*Pinus contorta* ssp. *murrayana*) is the most common species found in the meadow-forest ecotone and the most common meadow invader (Wood 1975). While there has been considerable research investigating successional change in Sierra Nevada meadows, no single variable has emerged to explain why some meadows are invaded by trees and shrubs, and others are not. At higher elevations and latitudes, upland woody plant invasion is hypothesized to be a response to warming temperatures, reduced snow pack, and in some cases, grazing by livestock (Bradley 1911, Ratliff 1985, Dull 1999, Gruell 2001, Veblen et al. 2003, Norman and Taylor 2005). Encroachment into lower elevation meadows, which have a much more complex history of land use, has been correlated with a larger number of factors that include fire, livestock grazing, and climate (Vale 1977, Norman and Taylor 2005). In general, conifers invade meadows during warm dry periods and are excluded from meadows during cool wet periods. Climate-induced successional patterns are likely within the NRV; however, climate in combination with other factors (e.g. fire suppression and grazing) that influence succession of meadows to tree or shrub dominated stands, have resulted in rates of invasion that trend outside of the NRV (Gross and Coppoletta 2013).

All meadows selected for restoration under this project are experiencing some level of conifer encroachment, which is decreasing overall size of the meadows and competing with meadow vegetation for water. Conifers are encroaching on a number of meadows and meadow perimeters in the LTBMU in part due to increased densification of surrounding forests which has increased the amount of seed that enters meadows.

Climate Change: Droughts are a familiar stressor on vegetation in the Lake Tahoe Basin. Climate change is a newly recognized threat to the condition of Sierran meadows that may be a significant contributor to droughts and is likely to exacerbate the problem of meadow drying. Because of their high sensitivity to

drying, montane meadows have been suggested as early indicators of environmental changes associated with climate change (Debinski et al. 2000). Future changes in climate (i.e., increasing temperatures) combined with a change from a snow-dominated to a rain-dominated system will alter the hydrologic regime and impact meadows. Total meadow area may decline and wet meadows may shift to dry meadows, especially small irregularly shaped meadows at low to mid elevations (Gross and Coppoletta 2013). Climate change will increase stress on meadow systems within the Lake Tahoe Basin. However, by reducing other influencing factors (e.g., channel incision, conifer encroachment) and improving conditions, meadow resiliency to climate change can be strengthened.

Trails and Recreation: Meadows are often situated in close proximity to recreational facilities such as roads, vacation cabins, campgrounds, and trails (Kattelman and Embury 1996). Meadows are also an important recreation resource for dispersed trail users and are valued for their unique scenic qualities. The Pacific Crest Trail and Tahoe Rim Trail pass through Meiss Meadow and are near other meadows selected for restoration under this project. Baldwin Meadow is adjacent to Baldwin Beach, a popular recreation site on the south shore of Lake Tahoe.

Structure, Composition, Diversity: Although the overall biomass in meadows is within the NRV, species diversity of plants and animals is outside of the NRV due to current rates of extinctions and the introduction of non-native invasive plant species. These altered processes have changed meadow structure and composition. The total area of meadows within the Sierra Nevada has decreased due to anthropogenic impacts on ecological processes. Willow flycatcher nesting habitat in the LTBMU is strongly associated with wet meadows and montane riparian habitat conditions. A reduction in willow cover and encroaching conifers has reduced the availability of habitat for the species. Similarly, adult Sierra Nevada yellow-legged frogs occupy wet meadows, streams and lakes; adults typically are found along the shoreline where there is little or no vegetation (Wright and Wright, 1933). Conifer encroachment decreases the basking habitat by increasing shade (decreasing sun exposure). Additionally, stream incision decreases meadow wetness which decreases habitat availability for this species.

The six meadows selected for evaluation in this project are outside the NRV due to a combination of influencing factors (grazing, conifer encroachment, head cuts, trail degradation) described above. We cannot currently identify which influencing factor(s) has had the greatest effect on the current condition. Our focus in this project is to build resilience and adaptability into the meadow's current condition. Below is a summary of the existing condition and past management of the six selected meadows.

Baldwin Meadow

Baldwin Meadow is a 121-acre meadow located on the south shore of Lake Tahoe in the Tallac Creek watershed; Township 12N and 13N, Range 17E, Sections 26 and 35 (Figures 1-3, 1-4). The Baldwin meadow is dominated by a mixture of grasses, sedges, rushes and herbaceous dicots. Meadow hydrology varies from dry to saturated, with some areas of standing water. Willows (*Salix* spp.) are found along creeks and in areas of high saturation. Conifers along the meadow edge include lodgepole pine and white fir (*Abies concolor*) with some Jeffrey pine (*Pinus jeffreyi*) in drier areas, and a second story of aspen (*Populus tremuloides*) and occasional mountain alder (*Alnus rhombifolia*) in the moist areas. The understory in the conifer zones is variable ranging from meadow vegetation in the more moist areas to drier upland herbaceous species such as mules ear (*Wyethia mollis*). There are swales found in some portions of the meadow, including at the northern edge, near the beach.

The current meadow condition has been influenced by a combination of conifer encroachment, past and current (albeit smaller scale) grazing activities and heavy recreation use at the adjacent Baldwin Beach day use site. The Baldwin Grazing Allotment, which encompassed the majority of the meadow, was

closed in 2008. During the last 27 years the meadow has been grazed by horses and mules with a range of 30 to 50 animals each year during a 7 day to 5 month period (Appendix F). A 20-acre private in-holding in the project area (see Figure 1-4) is still used for grazing and no project activities are proposed in this area. North of the meadow lies Baldwin Beach day use site, which is a popular and highly used recreation site from mid-May until closing in mid-October.

This meadow is designated as a bald eagle winter habitat area and a waterfowl management area by the TRPA (TRPA Code of Ordinances 2013). The meadow has also been historically occupied by nesting willow flycatchers (as recently as 2010), a Forest Service Sensitive species, and also contains willow flycatcher emphasis habitat which is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component.

There are three other projects surrounding the Baldwin Meadow project area: Taylor Tallac restoration, Aspen Community restoration, and South Shore Fuels treatment (see chapter 3, cumulative effects). There is a conifer removal and prescribed fire component within South Shore Fuels and Aspen Community restoration.



Figure 1-2: Top photos of Baldwin meadow show current meadow condition and remnant fencing from grazing allotment. Bottom photos show conifer encroachment in Baldwin meadow.

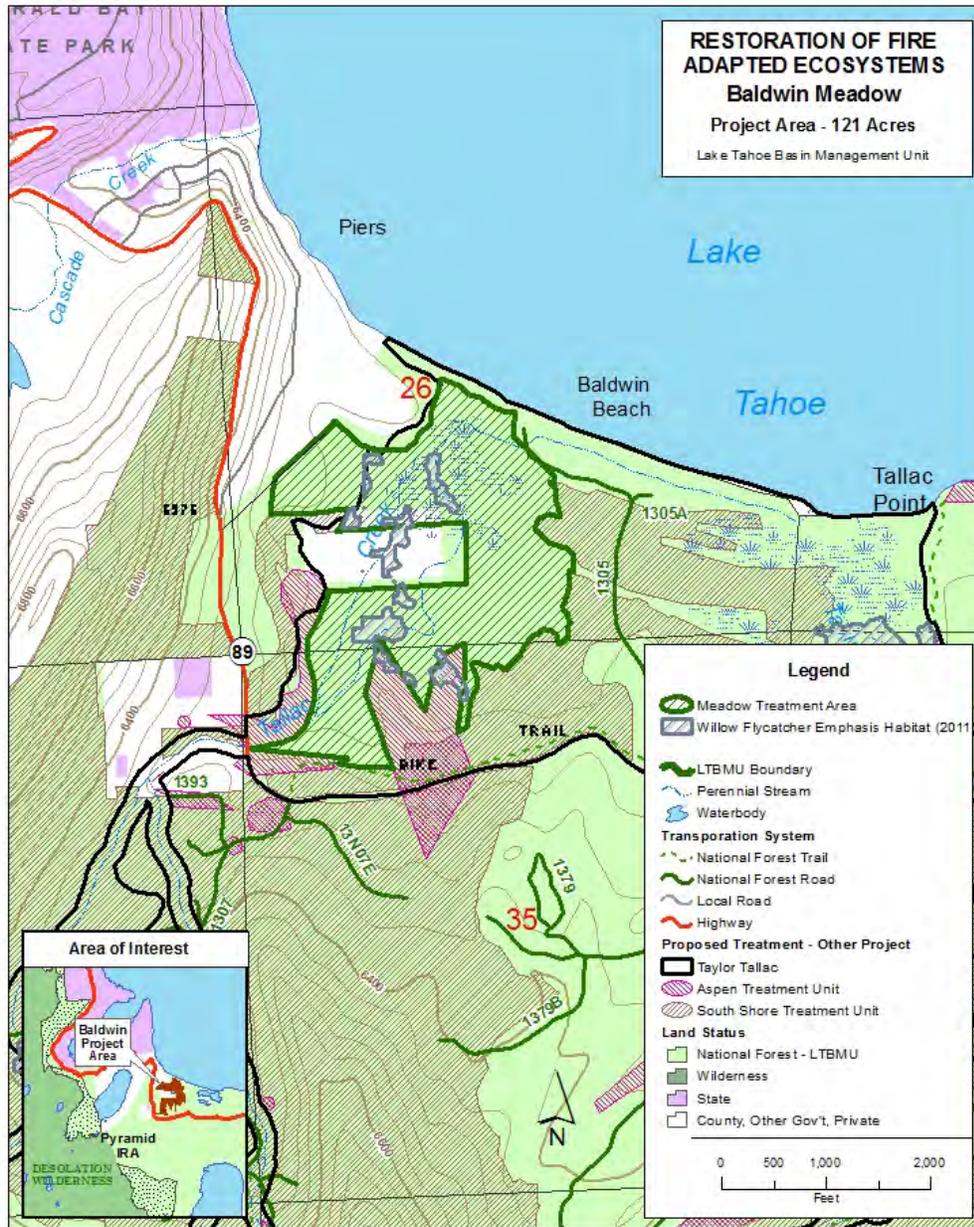


Figure 1-3: Baldwin Meadow Project Area.

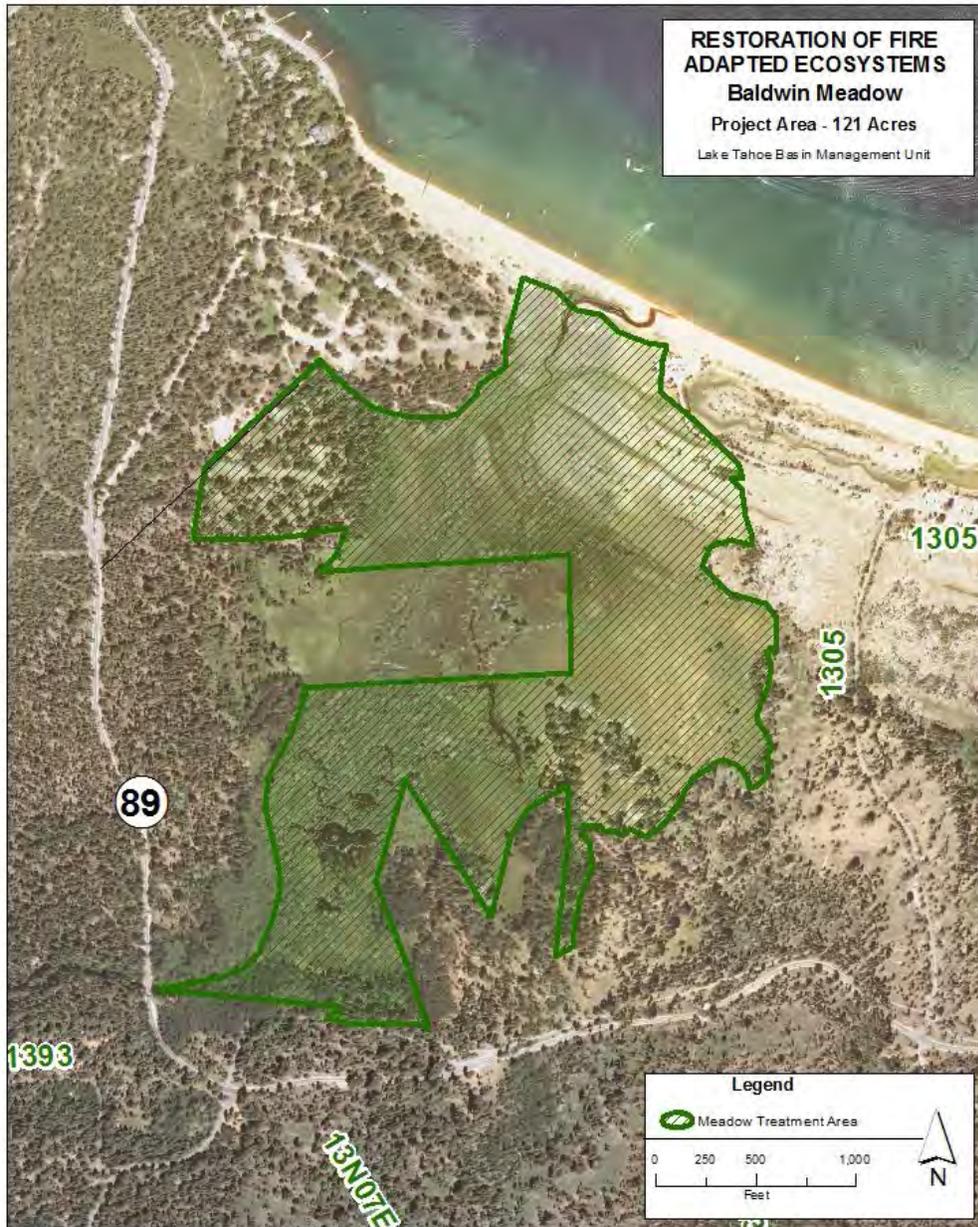


Figure 1-4: Baldwin Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010. The rectangular polygon that is excluded from meadow treatment is a 20-acre private inholding.

Benwood Meadow

Benwood Meadows includes two meadow areas for a total of 27 acres in the Upper Truckee River watershed located in Dardenelles Inventoried Roadless Area; Township 11N, Range 18E, Section 18 (Figures 1-6, 1-7). A variety of habitats occur within Benwood Meadow. Habitats typically transition from xeric (extremely dry), upland mixed conifer forests along the outside of the meadow to wet/saturated vegetation in the middle of the meadow. Habitats include: mixed conifer (Red fir [*Abies magnifica*]/white fir/Jeffrey pine) with a sparse or chaparral-dominated (pinemat manzanita/ huckleberry

oak: *Arctostaphylos nevadensis* or *Quercus vaccinifolia*) understory; mixed conifer with a herbaceous understory; dense lodgepole pine stands with mesic (moderately moist) or wet understories – typically around the margin of the meadow and encroaching inwards; mesic meadow communities (dominated by sedges) in the somewhat drier portions of the meadow; wet meadow communities (dominated by sedges) with standing water in middle of the meadow; a pond/aquatic environment (longleaf pondweed/yellow water lily: *Potamogeton nodosus*/*Nuphar lutea*) in the middle of Benwood Marsh; and a small aspen stand in the southwestern portion of the meadow.

The current meadow condition has been influenced by a combination of conifer encroachment and minor head cuts along a channel. Portions of the Pacific Crest Trail occur within the project area but the trail diverts pedestrian traffic away from the meadow. Benwood Meadow was not located within any of the four grazing allotments managed by the LTBMU since 1965.



Figure 1-5: Upper photos: Example of conifer encroachment at Benwood meadow. Conifer encroachment is concentrated in the NW portion of the project area at the edge of the meadow. Lower photos: Example of heavy fuel and dense forest conditions at the meadow boundary within the project area. Photos were taken along the SW side of the project where there is down wood in boundary.

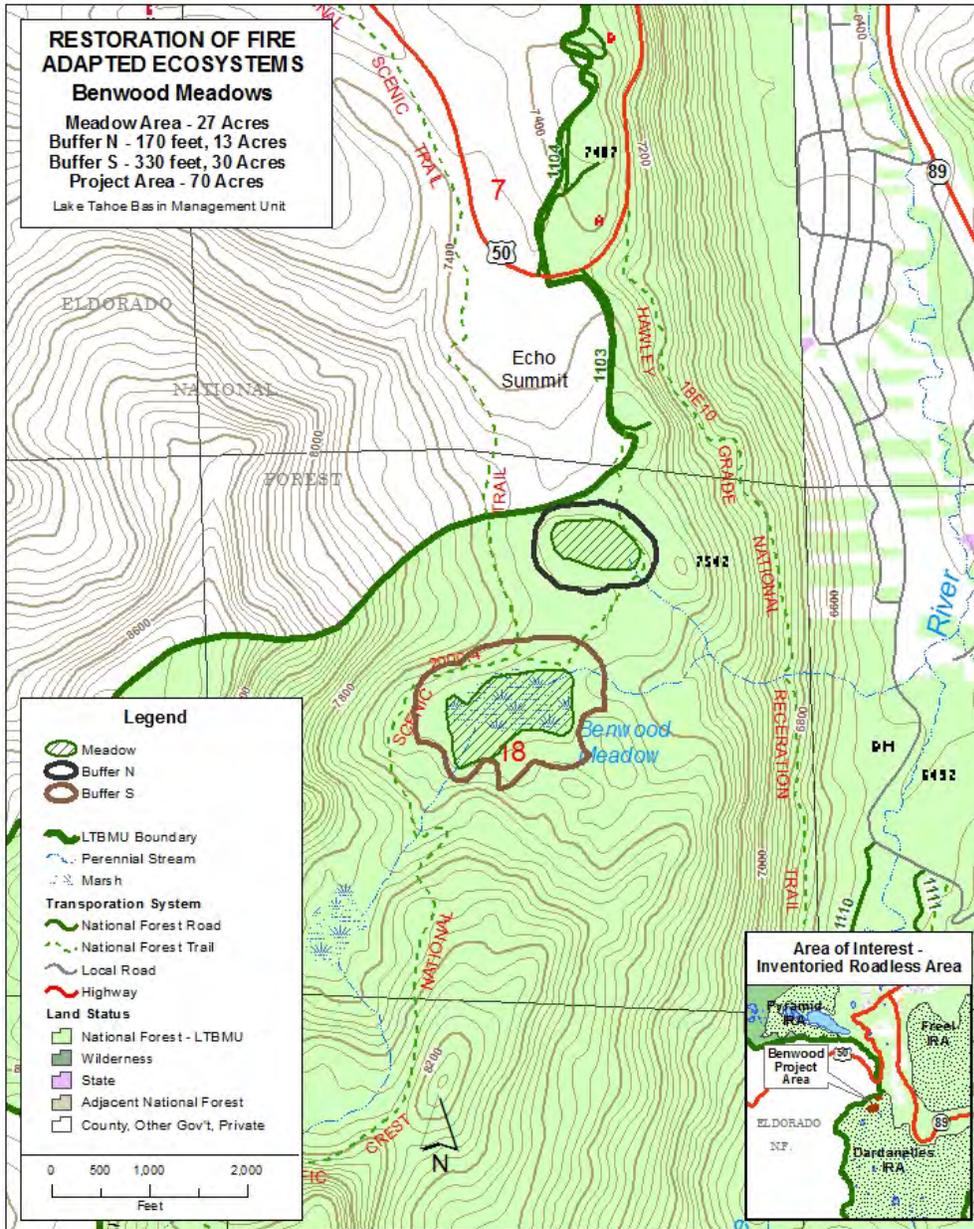


Figure 1-6: Benwood Meadow Project Area.

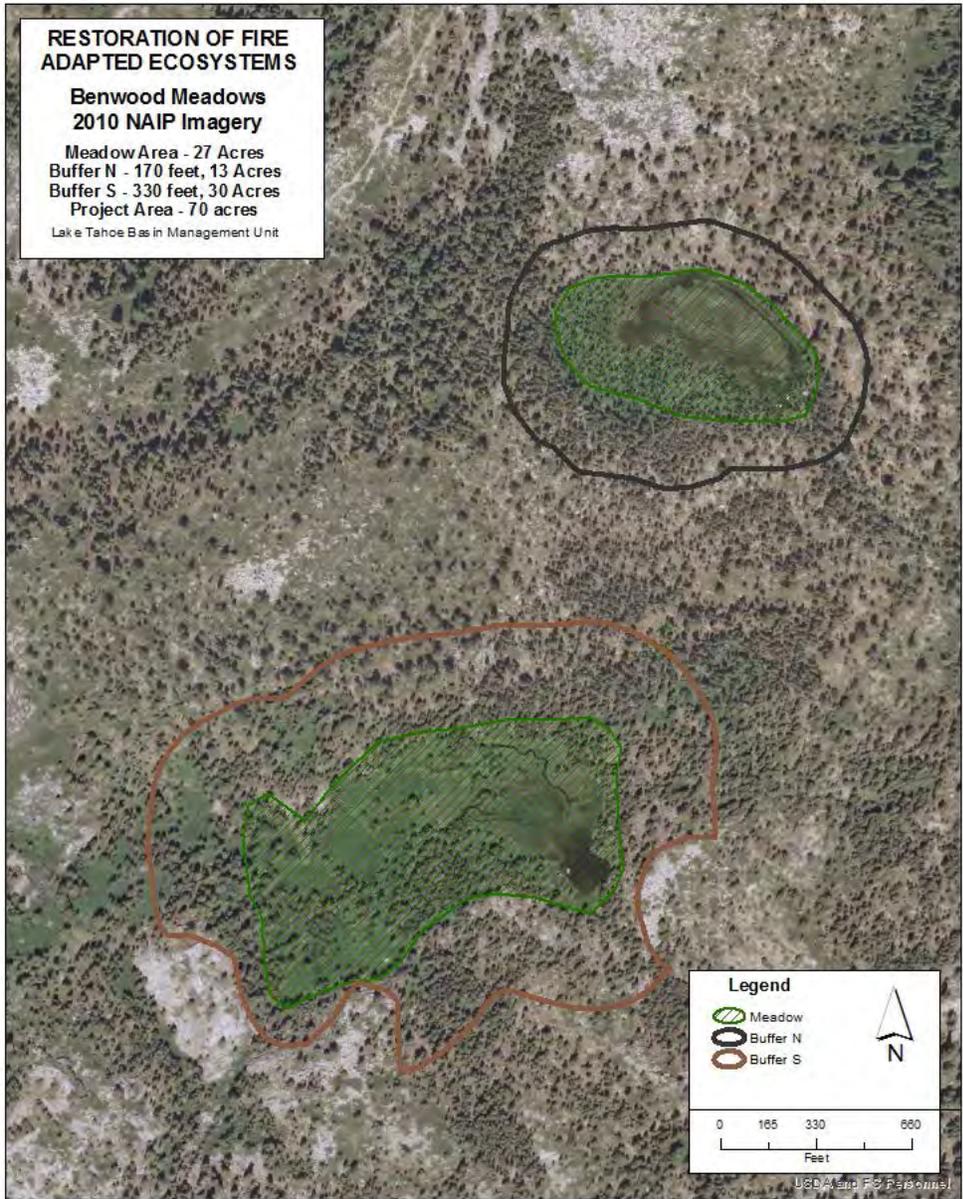


Figure 1-7: Benwood Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010.

Freel Meadow

Freel Meadow includes two meadow areas for a total of 21 acres in the Trout Creek watershed located in the Freel Inventoried Roadless Area; Township 11N, Range 18E, Section 12 (Figures 1-9, 1-10). Freel Meadow supports wet and mesic (moderately moist) herbaceous meadow communities. The meadow also supports xeric communities at the periphery, including both meadow and herbaceous vegetation types, as well as subalpine forest with scattered white bark pine (*Pinus albicaulis*), a Forest Service Sensitive species and candidate for listing on the Endangered Species Act (ESA).

The current meadow condition has been influenced by a combination of stream channel head cuts, past grazing activities, and minor conifer encroachment. The meadow is within the Trout Creek Grazing Allotment. The term grazing permit for this allotment was canceled in January 2012, leaving the allotment in vacant status. During periods of use over the last 49 years the meadow has been grazed annually for 2 months by 31 to 94 cattle (Appendix F). The Tahoe Rim Trail borders the meadow and diverts pedestrian traffic away from meadow.



Figure 1-8: Upper photos: Example of minor conifer encroachment at Freel Meadow. Lower photos: Example of head cut at Freel Meadow.

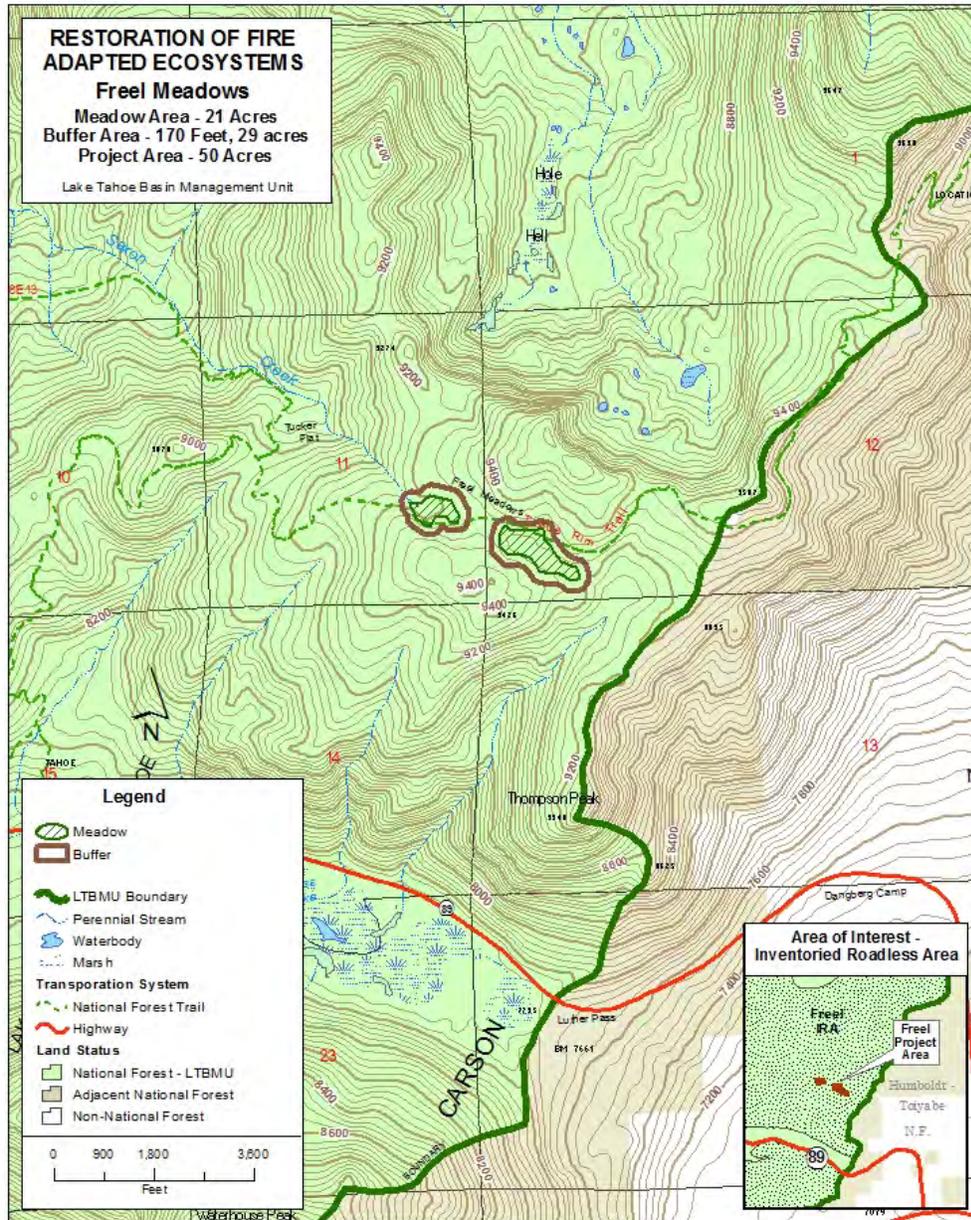


Figure 1-9: Freil Meadow Project Area.

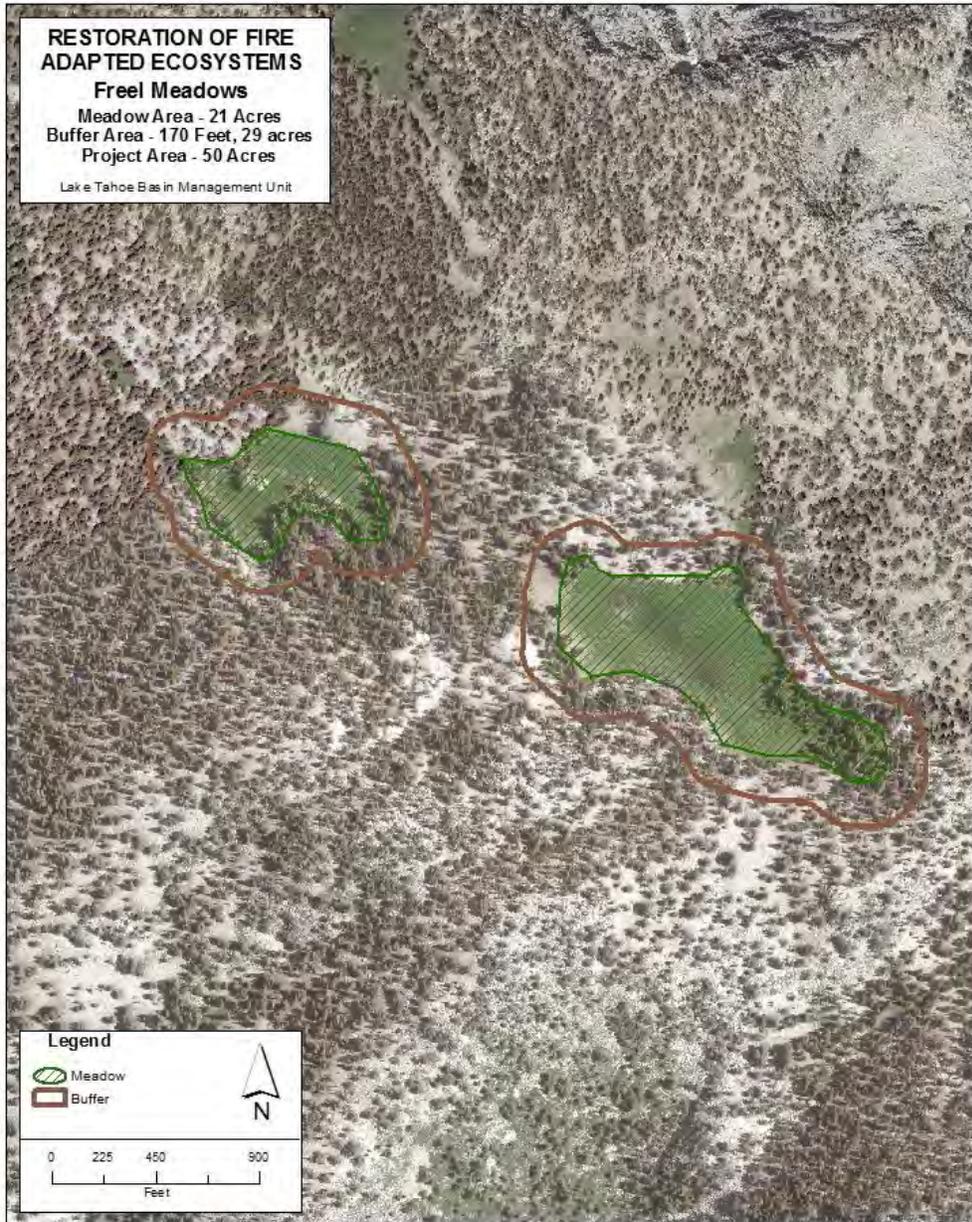


Figure 1-10: Freel Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010.

Hell Hole Meadow

Hell Hole Meadow project area includes two meadow areas for a total of 66 acres of meadow in the Trout Creek watershed located in the Freel Inventoried Roadless Area; Township 11N, Range 18E, Section 1 (Figures 1-12,1-13). Hell Hole supports a variety of habitat types including mesic meadows, wet meadows and fens, montane riparian stream channel, and mesic lodgepole pine forests which are primarily located at the meadows' edges. The lodgepole pine stands have encroached into the meadow. The Hell Hole complex is surrounded by open montane/subalpine forests with chaparral understory and abundant exposed talus and granite boulders.

The current meadow condition has been influenced by a combination of past grazing activities and conifer encroachment. Hell Hole Meadow is within the Trout Creek Grazing Allotment. The term grazing permit for this allotment was canceled in January 2012, leaving the allotment in vacant status. During periods of use over the last 49 years the meadow was grazed annually for 2-month periods by 31-94 cattle (Appendix F).

Hell Hole meadow provides suitable habitat for Sierra Nevada yellow-legged frog (*Rana sierra*), an endangered species under the Endangered Species Act (ESA) (listed April 29, 2014). This meadow may be designated as critical habitat by the US Fish and Wildlife Service. The final designation for critical habitat is expected in 2015. Additionally, multiple sensitive plant species are known in this meadow and the area contains willow flycatcher emphasis habitat.



Figure 1-11: Example of conifer encroachment and surrounding talus fields in Hell Hole Meadow.

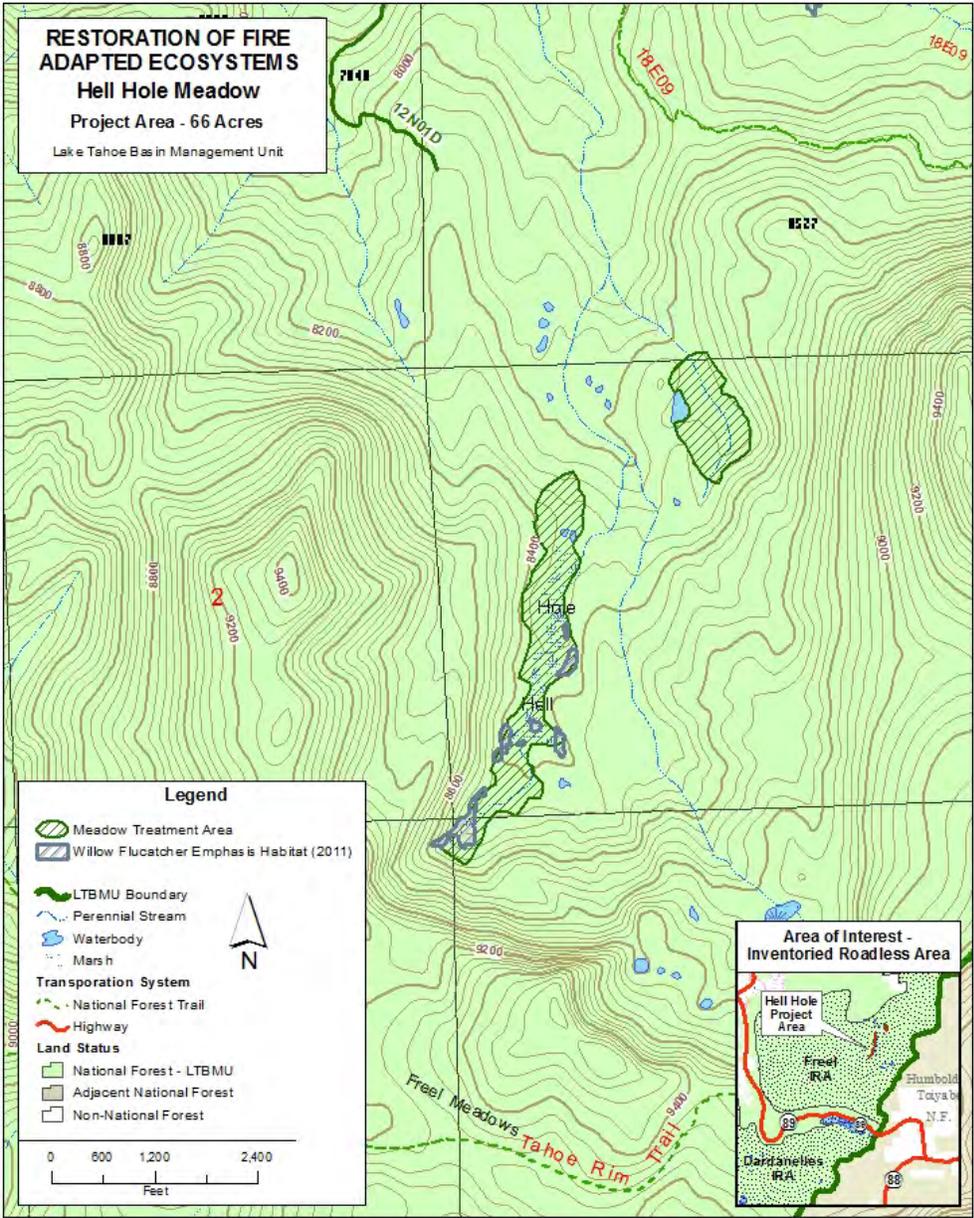


Figure 1-12: Hell Hole Meadow Project Area.

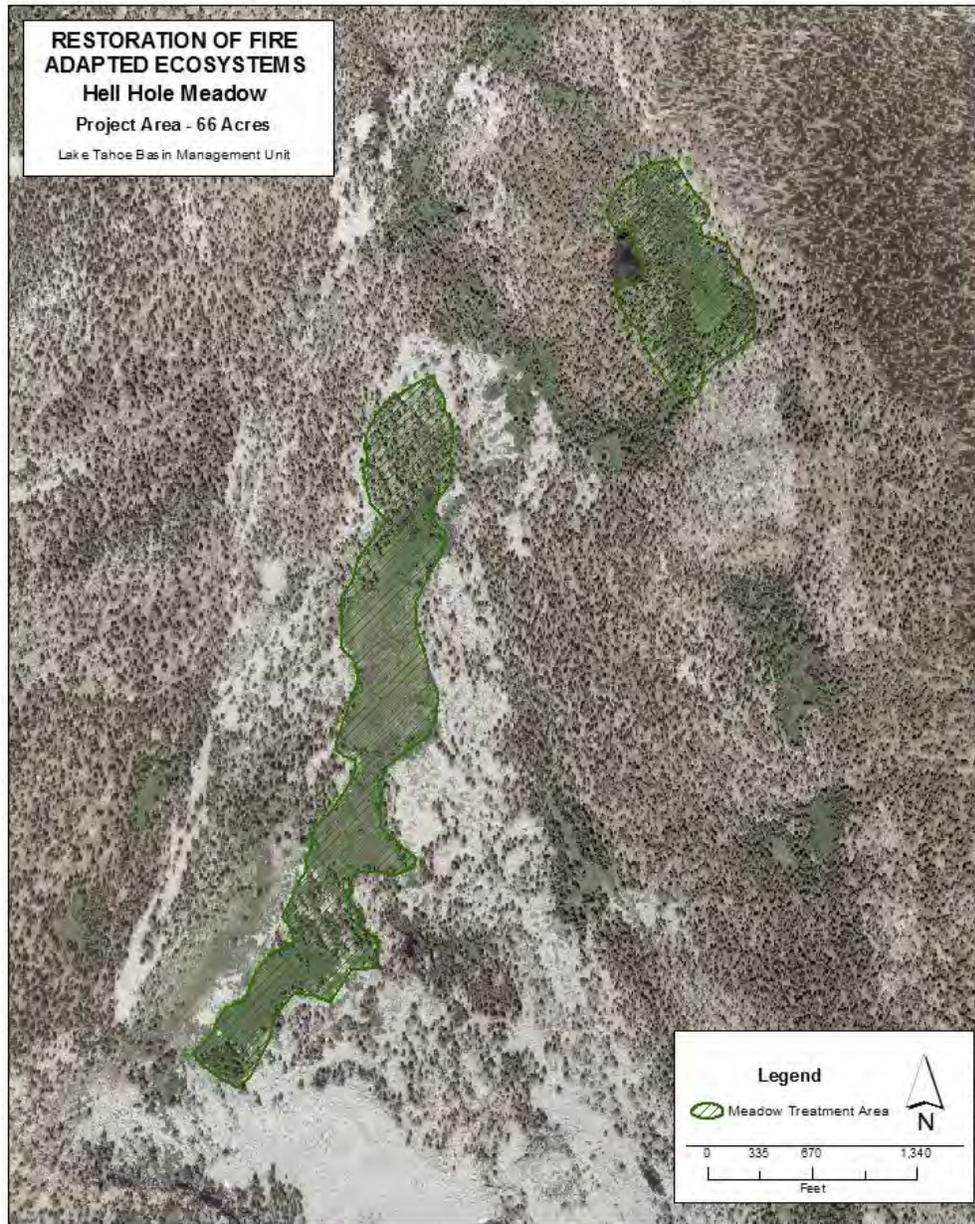


Figure 1-13: Hell Hole Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010.

Meiss Meadow

Meiss Meadow is a 285-acre meadow surrounding the headwaters of the Upper Truckee River and located in Dardanelles Inventoried Roadless Area; Township 10N, Range 18E, Sections 8, 9, and 16 (Figures 1-16, 1-17). Meiss meadow is a large meadow complex with a fairly narrow band of upland forest around its periphery. The moisture regime varies across the meadow with some sites being completely saturated throughout the year and others becoming extremely dry. The meadow as a whole could be considered a “moist meadow”; however, it experiences considerable drying throughout the growing season. During the early season the majority of the meadow is wet from snow melt. As the

meadow dries considerably throughout the growing season, even the “dry meadow” areas within the greater Meiss meadow complex support mesic (moist) or wetland species which thrive early in the year. Various plant associations occur within the actual meadow including: 1) willow thickets which typically occur along the stream with wetland forbs and graminoids; 2) submerged/pond environments dominated by sedges; 3) saturated meadow/seepy areas dominated by wetland forbs and graminoids; and 4) drier meadow variously dominated by grasses and forbs. The upland forest around the perimeter of the meadow complex is strongly dominated by lodgepole pine, and occasionally red fir and white fir as a dominant or co-dominant species. The forest understory is poorly developed, however areas of prickly currant (*Ribes* sp.), or areas with mesic streamside associations occur. Transitional areas between the upland forest and the actual meadow support associations of more upland species.

The current meadow condition has been influenced by a combination of past grazing activities, recreation, conifer encroachment, and stream channel head cuts in the Upper Truckee River. Meiss Meadow was grazed as part of the Meiss Grazing Allotment until 2002, when the permit was canceled. This allotment is in vacant status. During use periods in the last 32 years, the meadow was grazed annually for 1.5 to 3.5 month periods by 50-125 cattle (Appendix F). Portions of the Pacific Crest Trail (National Scenic Trail) and the Tahoe Rim Trail (National Recreation Trail) occur within the project area. Upgrades to all trail crossings on the Upper Truckee River that traverses the project area were completed in recent years to address stream bank erosion and to stabilize the trail approaches to the stream. However, some other sections of the trail are still adversely influencing meadow hydrology and are in need of repair.

This portion of the Upper Truckee River supports a self-sustaining population of Lahontan cutthroat trout, a threatened species under the ESA. Meiss Meadow also contains willow flycatcher emphasis habitat.



Figure 1-14: Example of conifer encroachment at Meiss Meadow.





Figure 1-15: Left column: historic photographs of Meiss meadow showing grazing and low density of conifers on meadow periphery. Right column: repeat photographs taken in 2014.

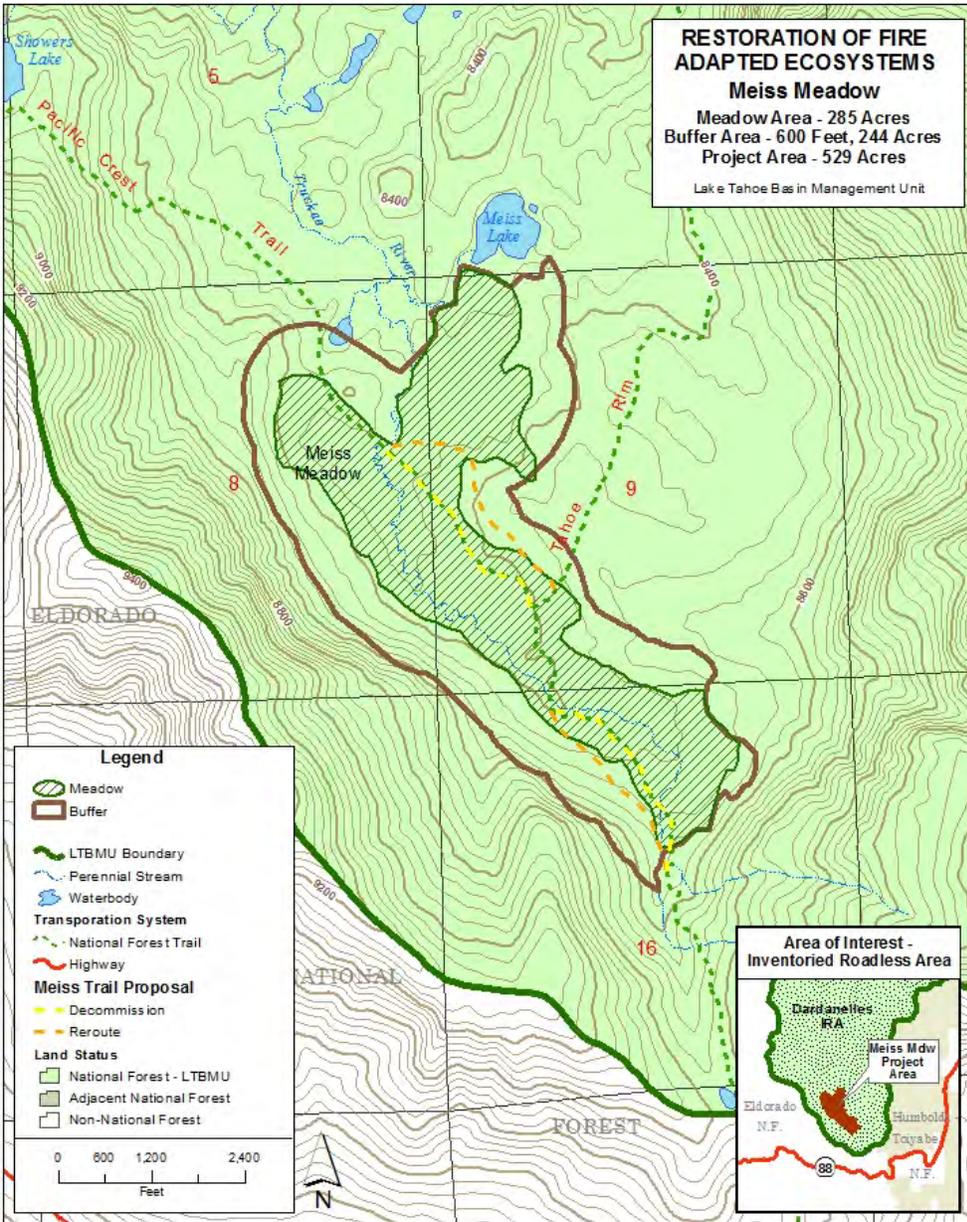


Figure 1-16: Meiss Meadow Project Area.

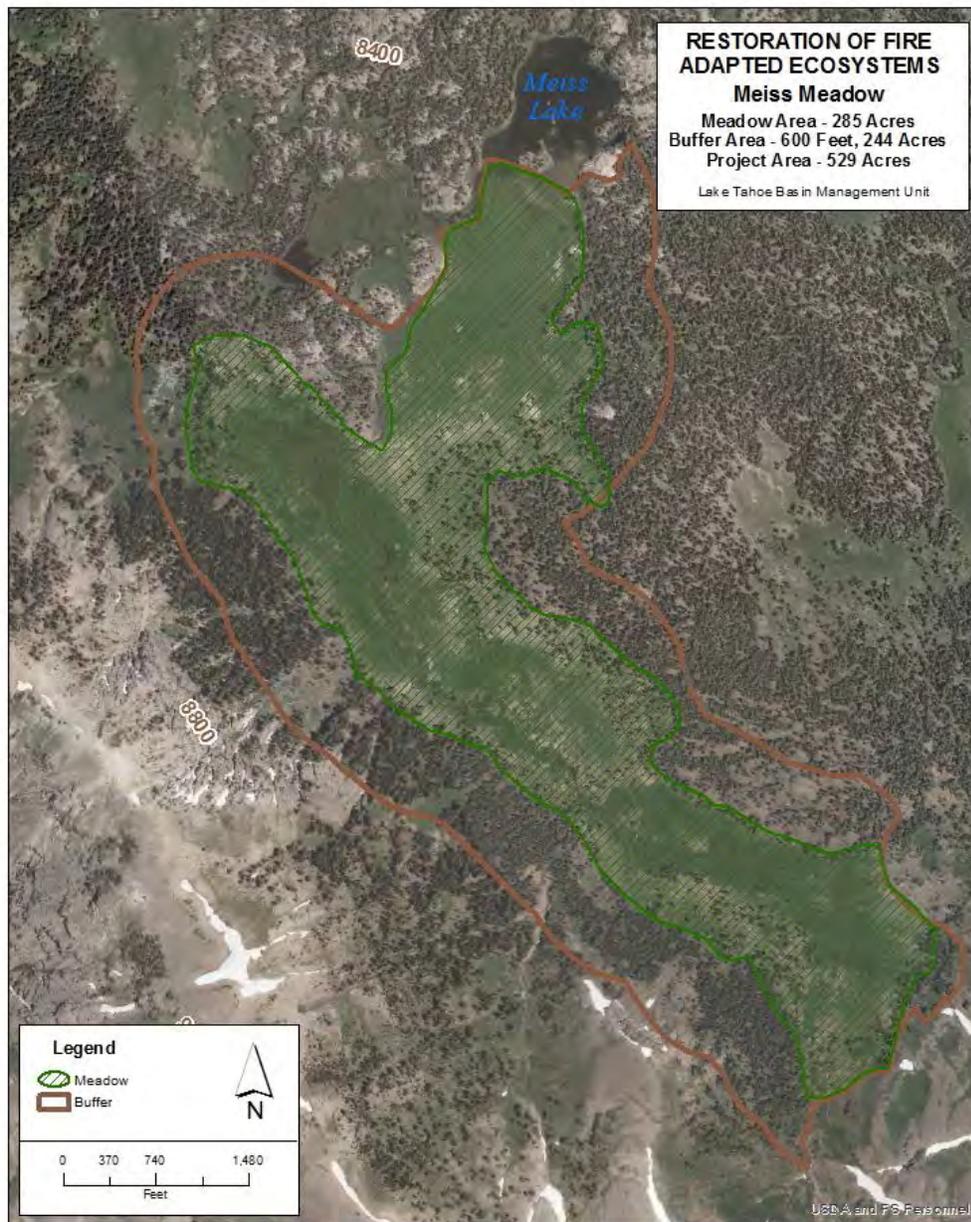


Figure 1-17: Meiss Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010.

Star Meadow

Star Meadow is a 13-acre meadow in the Cold Creek watershed located in the Freer Inventoried Roadless Area; Township 12N, Range 19E, Section 30 (Figures 1-19, 1-20). The Star Lake Meadow project area includes a variety of habitats ranging from xeric upland forests to saturated meadows and stream sides. Common plant associations/habitat types include: 1) mountain stream environments dominated by herbaceous perennials and various mosses; 2) dry mixed-conifer forests dominated by red fir and lodgepole pine, with scattered western white pine (*Pinus monticola*) and mountain hemlock (*Tsuga mertensiana*); 3) red fir forests with a chaparral understory of pinemat manzanita and an otherwise

poorly-developed understory; 4) lodgepole pine stands with mesic to extremely wet understories (typically occurring at the edge of the meadow and encroaching into the periphery of the meadow); 5) wet meadows/seeps with saturated soil, and dominated by herbaceous vegetation; 6) willow thickets with a wet herbaceous understory and various mosses; and 7) sub-alpine forests dominated by mountain hemlock and western white pine, with scattered white bark pine (*Pinus albicaulis*), which occur on the north-facing slopes above Star Lake Meadow. The mixed-conifer and sub-alpine forests where whitebark pine is growing is mainly open overstory with low densities and canopy covers. The trees are of various size classes except no saplings and seedlings have been located. White pine blister rust exists in the different size classes causing decline in health and mortality in some of the whitebark pine.

The current meadow condition has been influenced by a combination of past grazing activities, conifer encroachment, and a minor head cut. This meadow was part of the Cold Creek Grazing Allotment. This is a vacant allotment and no grazing has occurred since 2003. During periods of use over the last 28 years the meadow has been grazed annually for a 3-month period by 20 cattle (Appendix F).

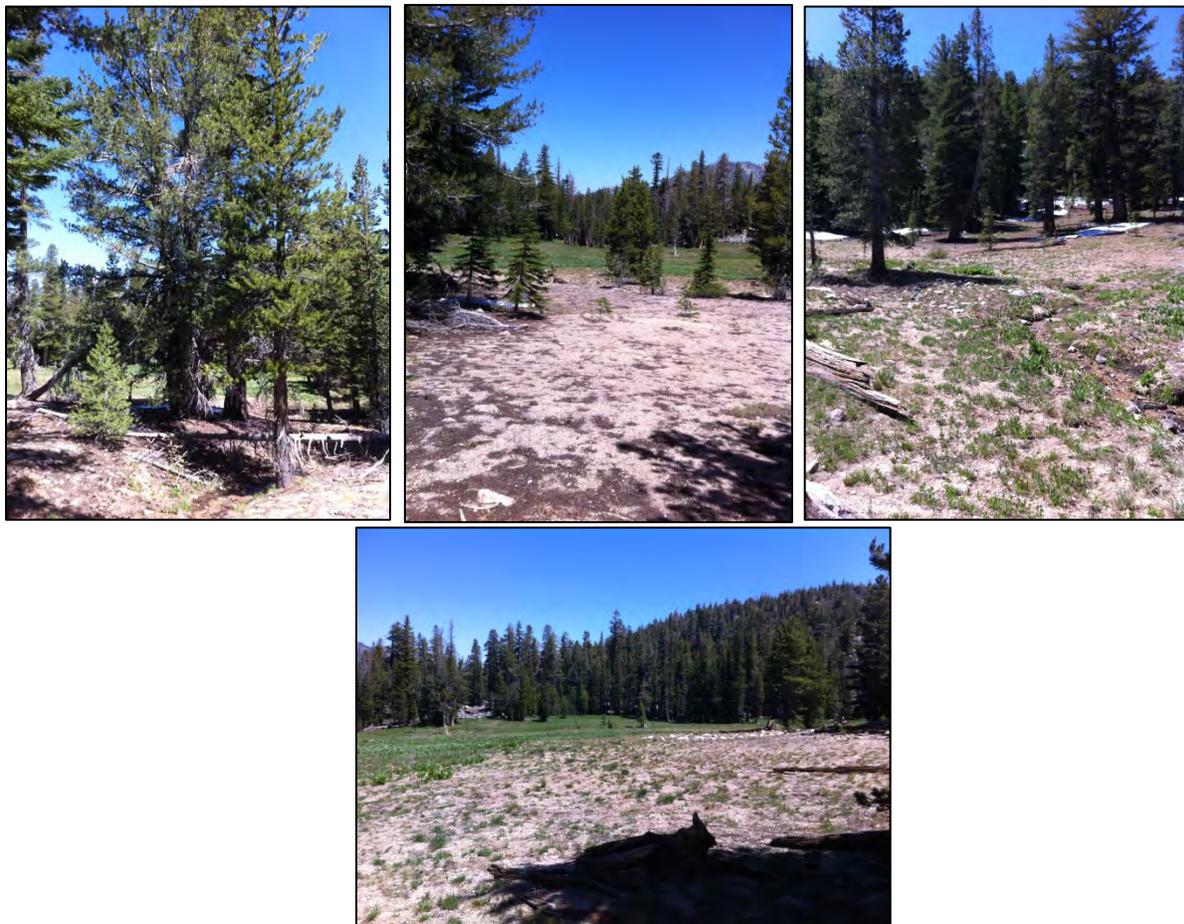


Figure 1-18: Upper photograph left and center: forested area surrounding Star Meadow. Upper right: stream channel. Bottom: Star Meadow.

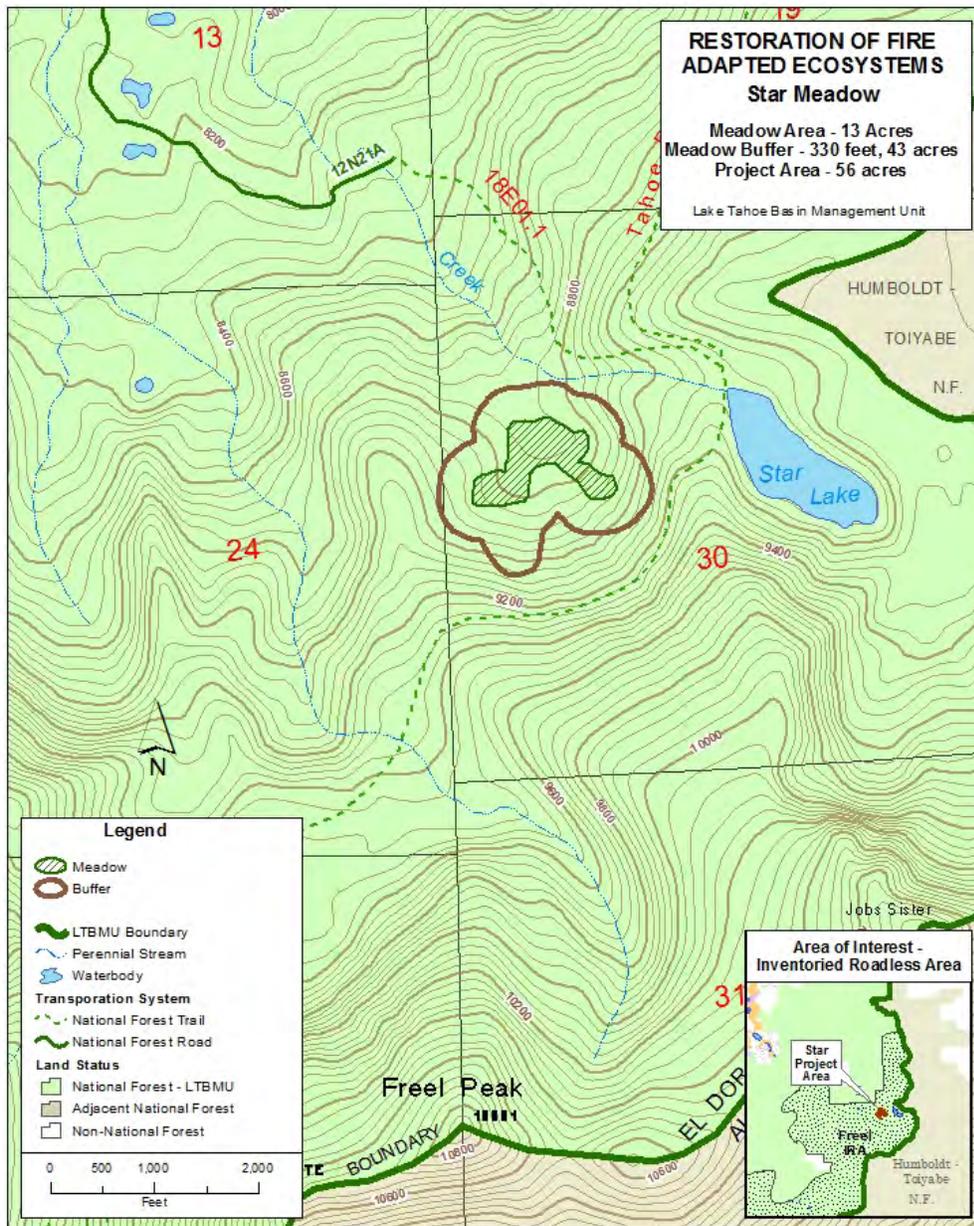


Figure 1-19: Star Meadow Project Area.

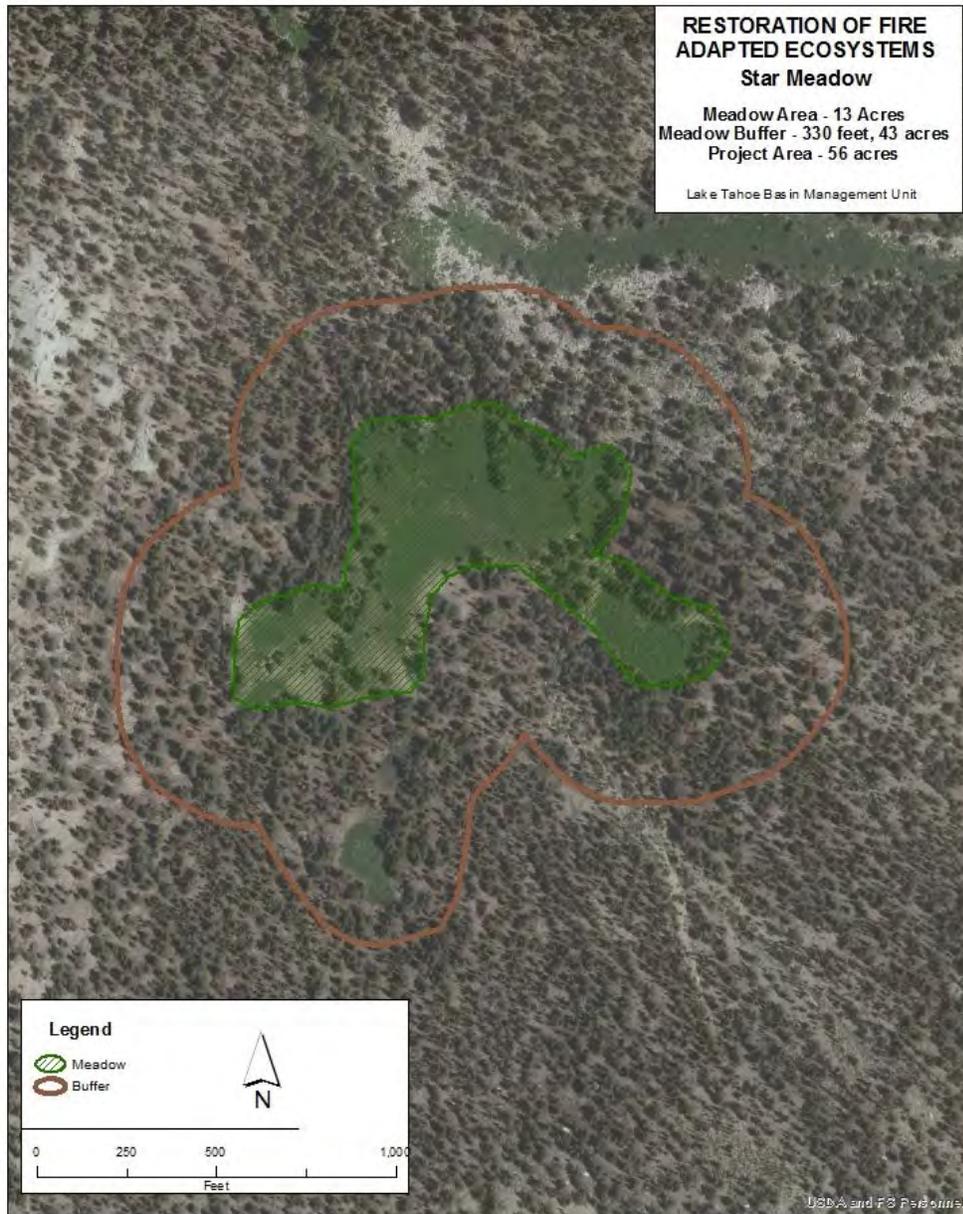


Figure 1-20: Star Meadow Project Area 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Image provides an idea of where conifer encroachment was present in 2010.

Desired condition

The proposed action is designed to improve condition of the six selected meadows so they move towards the natural range of variability (NRV) including the following desired conditions:

- At the scale of the Lake Tahoe Basin as a whole, the area of high functioning meadow vegetation and wet meadow vegetation (as defined by the Pacific Southwest Region range monitoring protocol, which was updated in 2013) is higher than in 2009 and the trend is up.
- Meadows exhibit qualities that enhance resilience to changing climate conditions.

- A high diversity of meadow types is represented in the LTB, and soil drying and conifer encroachment resulting from human management has been halted and reversed.
- Bare ground cover is reduced in many meadows. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration and retention, and contribute to plant and animal diversity.
- Healthy stands of willow, alder and aspen grow in appropriate places within and adjacent to meadows.
- Fire (prescribed or natural) or fire surrogates are used strategically to maintain and/or reclaim meadow landscapes from encroaching conifers, as well as to increase the vigor and diversity of herbaceous meadow vegetation.
- Channel incision and meadow soil loss is halted, via a variety of techniques including water diversion, stream restoration, and ditch filling.
- Meadows continue to adequately carry out important hydrologic functions. Meadows with perennial and intermittent streams do the following: dissipate stream energy from high flows and result in increases in infiltration rates, reducing erosion and improving water quality; filter sediment and capture bedload, with subsequent floodplain development; enhance floodwater retention and groundwater recharge through increased rates of infiltration; and support healthy root systems which stabilize streambanks against down-cutting action.
- Natural and anthropogenic disturbances are sufficient to maintain desired vegetation structure, species composition, and nutrient cycling.
- A diversity of plant functional types is present and regeneration occurs naturally within each meadow type. In places where past human disturbance has affected meadows, the abundance of plant functional types identified as disturbance-adapted species are decreasing. Meadow species composition is predominantly native, perennial species. Non-native species are not introduced into meadows. In certain places, prescribed fire may be used to favor increased growth of certain species.

Purpose of and Need for Action

The purpose of this project is to restore meadows within the natural range of variability. This restoration approach supports adaptations to changing future conditions, such as changing climate.

There is a need to restore physical and biological meadow processes (infiltration, percolation, evapotranspiration) and functions (terrestrial and aquatic diversity and abundance, flow dispersal, ground water recharge, sediment detention) to within the natural range of variability. The following specific needs have been identified:

- Reduce conifer and upland species invasion through thinning activities in the six identified meadows and buffer.
- Re-establish fire as a management tool to reduce conifer recruits and reduce xeric derived upland herbaceous species.
- Increase water availability and meadow wetness by significantly reducing the presence of conifer species through management identified above (thinning and fire).
- Restore willow flycatcher habitat by planting willows, and/or improving hydrologic conditions.
- Improve hydrologic conditions through head cut repair to prevent further degradation.
- Address chronic trail incision and soil loss resulting from trail crossings of wet meadow areas.

Decision Framework

Given the purpose and need, the LTBMU Forest Supervisor reviews the proposed action and the other alternatives in order to make the following decisions:

1. Whether or not to implement the project activities as described in the Proposed Action or select an alternative to the Proposed Action.
2. Whether or not to amend the Forest Plan to include less restrictive prescribed burning requirements in the 2014 timber waiver with Lahontan which would allow burning of piles between 25 and 50 feet from a channel.
3. Whether or not a Finding of No Significant Impact (FONSI) can be supported by the environmental analysis contained in this Environmental Assessment (EA).

Public Involvement

The proposal was first listed in the Schedule of Proposed Actions on April 1, 2010. The proposal was provided to the public and other agencies for comment during scoping June 22, 2012 to July 23, 2012. Public scoping included scoping letters mailed or emailed to interested parties.

In response to the scoping request, formal input was received from the following organizations and individuals: Pacific Crest Trail Association, Lahontan Regional Water Quality Control Board, and the Washoe Tribe of California and Nevada. Using these comments (see *Issues* section), the interdisciplinary team developed a list of issues to address.

Issues

Comments related to this project were grouped into two groups: **1. Non-Relevant Issues**, **2. Relevant Issues**. A Description of each group is outlined below. The Scoping Summary Report documents the comments and their categories and includes a list of non-relevant issues and reasons regarding their categorization as non-relevant. Responses reflect how comments were incorporated and addressed in this EA.

Non-Relevant Issues do not meet the Purpose and Need for the project; are outside the scope of the proposed action; are already decided by law, regulation, or Forest Plan; are not supported by scientific evidence; are addressed by project design features; or are addressed by additional information or clarification of the proposed action. Non-Relevant issues also represent opinions and statements which do not present problems or alternatives and include those comments that meet the Purpose and Need for the project but were considered in alternatives already studied and eliminated, or additional project design features were developed which reduced or eliminated the effects.

Relevant Issues meet the Purpose and Need for the project and are relevant because of the extent of the geographic distribution, the duration of effects, or the intensity of interest or resource conflict and therefore merit consideration for the development of an alternative to the proposed action.

No Relevant Issues were identified for this project. All comments were addressed through development of additional project design features or clarification to the Proposed Action.

Applicable Laws, Regulations, and Policies

All resource management activities described and proposed in this document would be consistent with applicable federal law and regulations, Forest Service policies, and applicable provisions of state law. The major applicable laws are as follows.

National Forest Management Act

The National Forest Management Act (NFMA) requires the development of long-range land and resource management plans. The LTBMU Forest Plan was approved in 1988 as required by this act. It has been amended several times, including in the Sierra Nevada Forest Plan Amendment (SNFPA) (USDA Forest Service 2004). The Forest Plan provides guidance for all natural resource management activities. The NFMA requires that all projects and activities be consistent with the Forest Plan. The Forest Plan has been reviewed in consideration of this project, and with the proposed non-significant Forest Plan amendment, the design of the project is consistent with the Forest Plan. A Forest Plan consistency matrix and review for this project was completed (Project Record).

Endangered Species Act

Federally listed species are managed under the authority of the Endangered Species Act (ESA) and the National Forest Management Act (NFMA; PL 94-588). In Section 7 of the ESA, it is required that federal agencies ensure that all actions are not likely to jeopardize the continued existence of any federally listed species. The ESA requires that a Biological Assessment (BA) be written and that the analysis conducted determine whether formal consultation or conference is required with the United States Department of Interior (USDI) Fish and Wildlife Service (FWS). The BA is prepared in compliance with the requirements of the ESA, Forest Service Manual 2670, and also provides for compliance with Code of Federal Regulations (CFR) 50-402.12.

The species analyzed in the Biological Assessment were based on the most recent lists provided by the FWS per their online website <http://www.fws.gov/sacramento/> and utilizing the FWS federal register listings for all federally threatened, endangered, proposed, and candidate species, including listed and proposed critical habitat, for the Lake Tahoe Basin Management Unit (LTBMU).

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into account the effect of a project on any district, site, building, structure, or object that is included in, or eligible for inclusion in, the National Register of Historic Places. Section 106 of the NHPA (Public Law 89.665, as amended) also requires federal agencies to afford the State Historic Preservation Officer a reasonable opportunity to comment.

Clean Water Act (Public Law 92–500)

All federal agencies must comply with the provisions of the Clean Water Act (CWA), which regulates forest management activities near federal waters and riparian areas. The design features associated with the Proposed Action ensure that the terms of the CWA are met, primarily prevention of pollution caused by erosion and sedimentation.

Section 404 of the CWA (33 U.S.C. 1344) regulates activities that result in the discharge of dredged or fill material into waters of the U.S., including wetlands. The US Army Corps of Engineers (USACE) has the principal authority to regulate discharges of dredged or fill material into waters of the U.S. Under Section 404 of the CWA, a permit from the USACE for the project's impacts to waters regulated by the CWA may be required.

Clean Air Act (Public Law 84-159)

The project area lies within the Lake Tahoe Air Basin and the El Dorado Air Quality Management District. Impacts to air quality have been considered for this project. The potential effects on air quality from the proposed action have been evaluated and would not result in significant impacts. This proposal would have some short-term impacts on air quality levels, due to pile burning of activity fuels and prescribed fire fuel burning; however, air quality levels would comply with all State and Federal air quality regulations. Prior to prescribed burning in this project, a burn plan would be prepared and reviewed by the LTBMU Forest Fuels Staff and signed by the LTBMU Forest Supervisor. This burn plan includes a Smoke Management Plan which is the basis for obtaining a burn permit from the Placer County Air Pollution Control District (APCD). In addition, RPMs are included for Air Quality (See Chapter 2 of this EA).

California Environmental Quality Act [CEQA] (Public Resources Code, § 21080)

The California Environmental Quality Act (CEQA) applies to discretionary projects to be carried out or approved by public agencies in California. The LRWQCB's process to grant a conditional waiver of waste discharge requirements on NFS lands is a discretionary act subject to CEQA. Prior to approving a project, the LRWQCB must certify that: 1) the environmental document has been completed in compliance with CEQA; 2) that the Lahontan Water Board has reviewed and considered the information contained in the environmental document; and 3) that the environmental document reflects the Lahontan Water Board's independent judgment and analysis (Cal. Code Regs., tit. 14, § 15090.).

Environmental Justice (Executive Order 12898)

Executive Order 12898 requires that all federal actions consider potentially disproportionate effects on minority and low-income communities, especially if adverse effects on environmental or human health conditions are identified. Adverse environmental or human health conditions created by any of the alternatives considered would not affect any minority or low-income neighborhood disproportionately.

The activities proposed in alternatives were based solely on the existing and desired condition of the meadows proposed in response to the purpose and need. In no case were the project activities identified based on the demographic makeup, occupancy, property value, income level, or any other criteria reflecting the status of adjacent non-federal land. Reviewing the location, scope, and nature of the proposed project in relationship to non-federal land, there is no evidence to suggest that any minority or low-income neighborhood would be affected disproportionately. Conversely, there is no evidence that any individual, group, or portion of the community would benefit unequally from any of the actions in the proposed alternatives.

Invasive Species, Executive Order 13112 of February 3, 1999

This EA covers botanical resources and invasive plants. An Invasive Plant Risk Assessment has been prepared (Project Record). The project's design features are designed to minimize risk of new invasive plant introductions.

Migratory Bird Treaty Act of 1918 as amended (16 USC 703-712)

The original 1918 statute implemented the 1916 Convention between the United States and Great Britain (for Canada) for the protection of migratory birds. Later amendments implemented treaties between the United States and Mexico, Japan, and the Soviet Union (now Russia). Specific provisions in the statute include the establishment of a federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." Because forest lands provide a substantial portion of breeding habitat, land management activities within the LTBMU can have an impact on local populations.

A Migratory Bird Report (Project Record) has been prepared for this project which fulfills the requirements of this act and Executive Order 13186.

Special Area Designations

Parts of this project are located within areas that are designated Inventoried Roadless Areas and Recommended Wild River. There are no other specially designated areas that would be affected by the project (i.e., Research Natural Areas and Wilderness Areas). The Upper Truckee River has been recommended as a Wild River in the area around Meiss Meadow. The LTBMU must manage the river to protect its free flowing character, and its Wild classification, in accordance with FSH 1909.12 Chapter 82.5 – Interim Management of Eligible or Suitable Rivers.

Inventoried Roadless Area Direction

Benwood Meadow and Meiss Meadow are located in Dardanelles IRA. There are approximately 599 project acres within Dardanelles IRA (Table 1-1), which will affect 4.3 percent of the entire IRA (Table 1-1). Freel Meadow, Hellhole Meadow, and Star Meadow are located in Freel IRA. The maximum project area with buffers is approximately 172 acres within Freel IRA (Table 1-1), which will affect 1.2 percent of the entire IRA (Table 1-1).

Table 1-1: Percentage of IRA's affected by proposed treatments

	Total Acres	Project acres in IRA	
Dardanelles	13,943.1	599	4.3%
Freel	14,894.1	172	1.2%

The Regional Forester issued direction regarding projects in IRAs. Per this direction, any projects planned in IRAs need to be thoroughly reviewed prior to public release.

This project includes the cutting or removal of generally small diameter trees to:

- Improve Threatened, Endangered or Sensitive species habitat.
- Maintain or restore the characteristics of ecosystem composition and structure, such as to reduce the risk of uncharacteristic wildfire effects within the range of variability that would be expected to occur under natural disturbance regimes of the current climatic period.

This project has been reviewed by both the State of California and the USDA Forest Service Washington Office and no concerns were raised (Project Record).

Recommended Wild River Direction

The Upper Truckee River has been recommended as a Wild River in the area around Meiss Meadow. The LTBMU must manage the river to protect its free flowing character, and its Wild classification, in accordance with FSH 1909.12 Chapter 82.5 – Interim Management of Eligible or Suitable Rivers. Chapter 82.51 – Management Guidelines for Eligible or Suitable Rivers, number 8 allows construction of minor structures and vegetation management to protect and enhance wildlife and fish habitat. Projects should harmonize with the area’s essentially primitive character and fully protect identified river values. Project activities would not affect the free flowing character of the Upper Truckee River or its Outstandingly Remarkable Values, and therefore would not affect its Wild River recommendation or the primitive character of the river.

Tahoe Regional Planning Agency

This project will be reviewed by TRPA consistent with the terms of the 1989 MOU between TRPA and the Forest Service. Depending on the extent of implementation phases, project permits may be required.

Local Agency Permitting Requirements and Coordination

Any ground-disturbing project activities that occur between October 15 and May 1 will require a grading exemption from TRPA and Lahontan Water Board. In addition, any required permits will be obtained from TRPA and / or the Lahontan Water Board prior to project implementation.

Chapter 2: Alternatives, including the Proposed Action

This chapter describes and compares the alternatives considered for the Restoration of Fire Adapted Ecosystems project. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public.

Alternatives

Alternative 1 – No Action

Under the No Action alternative, current management plans would continue to guide management of the project area. No activities would be implemented to accomplish project goals.

Alternative 2 – The Proposed Action

This project proposes to restore six meadows within the Lake Tahoe Basin (Table 2-1). Proposed restoration activities include conifer removal, prescribed fire, repair of identified stream channel head cuts, willow planting, and re-routing of trails. Meadows were selected based on vegetative trend data collected in 2004 and in 2009, results of the Meadow Restoration Pilot Project that was implemented in 2008 and 2009, past land management impacts, and field investigations. Meadows that have moderate to severe conifer encroachment, past grazing impacts that have altered plant community and altered hydrologic processes, declining vegetative trend, and provide or have the potential to provide critical habitat for Threatened, Endangered, Proposed, Candidate, or Sensitive (TEPCS) species were considered the highest priority meadows. This project focuses on six meadows that met these criteria and include: Baldwin Meadow, Benwood Meadow, Freel Meadow, Hellhole Meadow, Meiss Meadow and Star Meadow. Of these six meadows, five meadows are in Inventoried Roadless Areas (IRAs) (Table 2-1). Baldwin Meadow is the only meadow located outside of an IRA. Restoration at four meadows (Benwood, Freel, Star, and Meiss) would also include treatment of a buffer zone around the meadow; buffers were selected to 1) reduce conifer seed source into the meadow and 2) provide a resource protection zone during prescribed fire activity. The need for buffers (and their size) was identified through a combination of field and GIS analysis based on site conditions, including topography, surrounding vegetation density, and aspect. (Buffers for each of these four meadows are shown in the Figures in Chapter 1.) Baldwin Meadow does not have a treatment buffer because the South Shore Fuels and Aspen Community Restoration projects are treating the surrounding area. Hell Hole Meadow does not have a buffer because it is surrounded by boulders and talus.

Table 2-1: The six meadows selected for the Restoration of Fire Adapted Ecosystems Project on the Lake Tahoe Basin Management Unit (LTB). Acres of each meadow, including buffer and Inventoried Roadless Area (IRA) are included.

Meadow Name	Inventoried Roadless Area (IRA)	Category	Total Meadow Acres	Maximum treatment buffer feet/acres	Maximum Project Area (acres) with buffers	Total Acres in IRA
Baldwin Meadow	N/A	N/A	121	0*	121	0.0
Benwood Meadow	Dardanelles	Roadless	27	330/43	70	70
Freel Meadow	Freel	Roadless	21	170/29	50	50
Hellhole Meadow	Freel	Roadless	66	0**	66	66
Meiss Meadow	Dardanelles	Roadless	285	600/244	529	529
Star Meadow	Freel	Roadless	13	330/43	56	56
Total Acres			533	***N/A/172	892	771

*No buffer is required to implement this proposed meadow because South Shore Fuels Reduction Project and Aspen Restoration projects will remove conifers from both the project area and the surrounding area.

**No buffer is required due to the boulder/talus fields surrounding the meadow.

***N/A because the treatment buffer varies in length between the treatment areas and cannot be totaled.

Conifer Removal

All conifer removal will be conducted by hand treatments. Conifers may be removed completely within the meadow. In addition to meadow treatment, four meadows have buffers that will be thinned to reduce future conifer seed source into the meadow and to act as a fire-control measure to allow for optimal control of prescribed fire within the meadow (Table 2-1). The amount of trees thinned within the buffers will depend on the existing stand conditions. Hand thinning treatments (meadow and buffer) would include felling of live trees up to 18 inches diameter at breast height (dbh). Trees larger than 18 inches that are considered a seed source for future encroachment may be felled, girdled, or piles may be placed underneath to encourage tree mortality. This activity will only occur in areas where future snags will not pose a hazard along trails. These trees would provide wildlife habitat, such as snags, following burning. Additional woody debris, slash and bole wood will be lopped and scattered. This activity will occur where 1) lop and scatter density is low enough to scatter organics on the ground and/or 2) lop and scatter provides an advantage to carrying the fire through herbaceous vegetation. In areas where vegetative density is too high to lop and scatter or lop and scatter is not beneficial for broadcast fire, material would be piled for burning. Healthy trees will be retained first as a priority as well as preferred species. Whitebark pine, where it exists will be retained first as a preference, then western white pine. Removal of whitebark pine will be minimized and the species will be favored for retention. Where removal of whitebark pine is necessary, refer to the botanical resource protection measures for specific information on prioritization for selection for removal and retaining white bark pine. Lodgepole pine and white fir will be the trees selected first for removal. Priority for removal would also be based on size of the trees with activities mainly removing the smaller trees. No permanent or temporary roads will be constructed for proposed implementation activities in any of the meadows within the project area. Surface fuels (coarse woody debris) may be treated with the methods described above.

Prescribed Fire

Prescribed fire will be used primarily to remove small conifers within the meadow. A secondary benefit of prescribed fire may be to enhance native riparian plant vigor and diversity. Prescribed fire may be used as the primary treatment method or subsequent to thinning treatments and would occur within the stream environment zone (SEZ) or upland areas that will serve as the buffers. Fire intensity would be low to moderate and duration would be limited. Broadcast burns will be more effective at lower elevation meadows that have continuous cover of vegetation and slash to carry the fire (Frenzel 2012). Pile burning of thinned material would occur within thinning treatments; these will be concentrated at the meadow boundary when feasible. Existing roads and trails would be utilized as fire lines to minimize new ground disturbance, though additional fire lines may need to be constructed with hand tools within limited portions of SEZs. Any needed fire lines within meadows would primarily be wet-line construction, hard line would be minimized. All constructed fire lines would be rehabilitated after implementation following the Region 5 Best Management Practices (BMPs) (Appendix A) and resource protection measures (RPMs). Rehabilitation activities may include using hand crews and hand tools to rake in berms, install water bars, and scatter downed wood. For feasibility of implementation, burn piles may be adjacent to existing trails; however, where feasible, they will be moved at least 25 feet from existing system trails. Livestock may be used to transport materials; all materials would be fully suspended on the back of the animals using existing trails. Overnight stays of livestock are not expected.

A non-significant Forest Plan Amendment is also proposed for this part of the project. The 2014 timber waiver with Lahontan includes a 25-foot buffer for prescribed burning of piles near a stream channel. This is less restrictive than our 1988 Forest Plan buffer of 50 feet (“Locate activity burning beyond 50 feet of any stream channel or standing water” and “Design prescribed fire activities to avoid adverse effect on soil and water resources. Flame height will not exceed two feet within 50 feet of stream courses or on wetlands unless higher intensities are required to achieve specific objectives”). Therefore, we are proposing to amend the Forest Plan for this project to allow burning of piles between 25 and 50 feet from a channel.

Head cut Repair

Small stream channel head cuts identified in the project meadows may be repaired during implementation activities. A head cut is an unstable erosion point in a stream channel that actively erodes during periods of high flows and results in channel incision, meadow drying, and loss of aquatic habitat. A small head cut is one where no heavy equipment will be needed for treatment. Head cuts will be stabilized by hand crews using on-site rock, log material, willows, or other vegetative material. Head cuts larger than the capabilities of a hand crew are outside the scope of this project and will not be treated under this project; in general this will limit the project to repairing head cuts less than approximately 2 feet high. In order to avoid diverting flows, any head cuts identified on perennial channels will not involve excavation or earth movement; actions will focus on strategic placement of onsite material minimized to the extent feasible.

Re-establishment of the Meiss Corral

The Meiss Corral is an integral feature of the historic Meiss Cabin/Barn complex. To restore historic conditions as well as ecological conditions, conifer thinning in the meadow provides a unique opportunity to re-establish the corral. The corral has deteriorated beyond a desirable condition and restoration is the preferred preservation treatment. The corral currently has rotted and broken logs that are not possible to rehabilitate or stabilize. The large diameter lodgepole trees removed for this meadow restoration project would provide the logs needed to restore the corral, matching both the original material and construction method.

Willow Planting

Meadows that are within occupied or historic willow flycatcher sites, or within 2 miles of willow flycatcher emphasis habitat and are in a declining condition for willow flycatchers would be enhanced

through willow planting. All planted willows will be the same species that occurs at the meadow site during time of implementation. In meadows with willow flycatcher emphasis habitat, willow planting would be targeted in or near the existing emphasis habitat to enhance, improve connectivity, and/or expand this habitat. In meadows within 2 miles of emphasis habitat, willow planting could occur in up to 20% of the meadow area in sections where late-season standing water is expected. Willow cuttings will be taken from within the meadow and used as stakes, or in some cases wattles and fascines. Depending on the existing vegetation cover some ground disturbance may be necessary to remove the graminoid layer so that graminoids do not outcompete willow establishment.

Trail Reroute

Segments of the Pacific Crest Trail and Tahoe Rim Trail will be re-routed from low-lying wet meadow areas of Meiss Meadow to higher capability soil areas adjacent to the meadow edge. Old trail segments will be decommissioned and restored to a condition which does not impede meadow hydrology (Figure 1-16). During decommissioning the existing trail would be decompacted, native duff/mulch would be added to the footprint, and access to the rehabilitated area would be blocked using native materials. No revegetation would occur.

Table 2-2: Anticipated implementation strategies that might be used at each of the six meadows. Specific treatment strategies and needs will be identified prior to project implementation. In some meadows the primary strategies to be used have already been identified and are identified in bold.

Implementation Tool	Baldwin Meadow	Benwood Meadow	Freel Meadow	Hell Hole	Meiss Meadow	Star Meadow
Conifer Removal	X	X	X	X	X	X
Prescribed Fire - Pile Burn	X	X	X	X	X	X
Prescribed Fire - Broadcast Burn	X	X	X		X	X
Lop and Scatter	X	X	X	X	X	X
Head cut repair		X	X		X	X
Re-establishment of Meiss Corral					X	
Willow Planting	X	X	X	X		
Trail Reroute					X	

Monitoring

A monitoring plan will be developed prior to project implementation based on the meadow location, restoration strategies, and questions at time of implementation.

Maintenance

Future maintenance treatments will occur for each meadow and will be identified during meadow prescription development. The goal of maintenance is to address the optimal timing and fire return interval needed to prevent future conifer invasion. Depending on timing, maintenance could be a combination of activities described for each meadow (Table 2-2). The maintenance treatments will occur at irregular intervals, based on elevation, aspect, meadow wetness, and available resources.

Resource Protection Measures

Activities associated with implementation of this project could have localized, short-term effects. The following resource protection measures (RPMs) have been incorporated into the Proposed Action and are intended to minimize or avoid effects on soils, water, vegetation, wildlife, fisheries, heritage resources, recreational resources, and air quality. In addition to the following RPMs, applicable BMPs are identified in Region 5 USFS Water Quality Management Handbook (USDA Forest Service 2011). BMPs are

standard management practices that have been developed to protect soil and water quality. These practices and procedures provide the structure for water quality management for the Pacific Southwest Region (Region 5). The BMPs comply with Section 208 and 319 of the Clean Water Act, and the guidelines of the Water Quality Control Board Basin Plan. Implementation of these State certified and EPA approved BMPs meet the Forest Service obligations for compliance with water quality standards and fulfill Forest Service obligations as a designated Water Quality Management Agency. Detailed specification for these BMPs would be incorporated into the SWPPP (Storm Water Pollution Prevention Plan).

General

Due to the ecological nature of this project, project prescription/design will be led by an ecologist who has extensive knowledge and experience in understanding meadow ecology. The project lead will consult with appropriate staff at all phases of design and prescription development.

- Within the forest buffer area, a certified silviculturist will write or approve prescriptions.
- All resource staff will be consulted prior to maintenance treatments. Time may be needed for additional surveys and/or resource protection measures to be developed, consultation, permitting, etc., prior to maintenance occurring.

Aquatic Resources

General aquatic resource protection measures. The resource protection measures are also provided in the Biological Evaluation for Aquatic Wildlife Species, available in the project record.

- Leave existing downed trees and large woody debris (LWD) that are in perennial or intermittent stream channels in place unless channel stability needs, as determined by an LTBMU Fisheries Biologist and/or hydrologist, dictate otherwise (LRMP STD/GD 15).
- Use directional falling to keep felled trees out of intermittent and perennial streams unless the channel reach is identified as deficient in large woody debris, in which case a FS Fisheries Biologist in collaboration with a vegetation specialist shall select trees greater than 12 inches dbh to be felled directionally into the channel.
- To avoid removing or altering bank stabilizing vegetation, restrict tree removal (live or dead) within 5 feet of a perennial or intermittent stream channels or other water bodies (e.g. lakes, ponds) unless approved by fisheries biologist or watershed specialist (hydrologist) and the action is needed to meet desired conditions (e.g. where fuel loads or stand densities exceed desired conditions and where coarse woody debris (CWD) is at or above desired levels or where trees are a hazard to safe operations).
- Retain/add downed wood in the open meadow areas where feasible for native amphibian species. Density should be approximately three logs >30 cm diameter at midpoint per 0.4 ha.
- Retain or girdle large trees (>24") for future large wood recruitment in stream channels (e.g. when a tree would naturally fall into the stream) unless removal is necessary for project implementation activities.
- Use screening devices for water drafting pumps. Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats. (SNFPA standard 110)
- Water drafting sites should be located in areas that will avoid adverse effects to stream flows and depletion of pool habitat. If instream flows or water drafting sites are not sufficient due to a lack of water, water would be obtained from local municipal water hydrants. Water drafting sites will be reviewed by a hydrologist or fisheries biologist every two weeks during low flow periods and determinations made regarding adequate minimum flows. If flows are not adequate for instream needs, drafting will be discontinued.

- Any incidental sightings of special status fish and wildlife species would be reported to the project or staff biologists. Species identification, known locations, and protection measures would be brought up during a pre-treatment meeting.
- All equipment (e.g. field gear, pumps) used in a water body during project implementation shall be inspected and free of invasive species prior to implementation. Equipment should be free of all soil and plant material, and should be dried prior to moving to a different meadow.
- Annual inventories or additional Resource Protection Measures for Sierra Nevada yellow-legged frog in suitable habitat may be required based on the forthcoming programmatic biological opinion. Required surveys shall be conducted by an LTBMU aquatic biologist or under the direction of an LTBMU aquatic biologist.

Hell Hole Meadow resource protection measures

- Two surveys (a minimum of two weeks apart, one survey needs to be conducted within 30 days of implementation) for Sierra Nevada Yellow Legged Frog (SNYLF) will be conducted prior to implementation each year for all proposed actions (same field season).
- No broadcast burning will be permitted (not being proposed in Hell Hole).
- Location of piles will be coordinated and approved by aquatic biologist. Aquatic biologist will be on-site during piling and burning of the piles.
- No burning will occur until meadow conditions are such that adult SNYLF have moved into aquatic habitat (stream or ponds). Burning will only occur late fall (if meadow does not have standing water) or during the winter. Aquatic biologist will be on-site during implementation.
- No water drafting will occur without approval of aquatic biologist. Aquatic Biologist will be on-site during implementation.
- Ensure that field gear (waders, boots, hoses, etc.) is cleaned, decontaminated, and/or fully dried prior to working in Hell Hole and when leaving Hell Hole. Decontamination will follow Chytrid decontamination protocol – see Appendix B.
- Maintain a Sierra Nevada yellow-legged frog (*Rana sierrae*) LOP April 15 through August 15 within a minimum of 25 feet of known breeding sites. Prohibit habitat manipulation or other activity that could create bank disturbance unless surveys confirm that egg masses are not present.
- Additional Resource Protection Measures may be added or existing RPMs may be amended pending the listing status of SNYLF Critical Habitat, the completion of USFWS Biological Opinion, and/or the development of a recovery plan.

Soil, Water, & Riparian Resources

In order to minimize impacts to water resources from the proposed activities, BMPs would be implemented (USDA FS 2011). The basic premise and emphasis for BMPs and the project-specific resource protection measures to implement them are to prevent sources of erosion and dissipate or infiltrate runoff generated by the project before reaching waterbodies. (See Appendix A for a listing of BMPs.)

The project specific resource protection measures have been developed to minimize or avoid both direct and indirect negative effects of treatments on forest resources and to meet the Riparian Conservation Objectives of the LTBMU Forest Plan (1988), as amended by the Sierra Nevada Forest Plan Amendment (USDA Forest Service, 2004). These objectives address provision of beneficial uses for water resources, geomorphic and biological characteristics of aquatic features, suitable stream habitat features (including CWD), and physical and biological characteristics of riparian areas.

General resource protection measures

- Spill prevention and cleanup of hazardous materials would be implemented in accordance with the LTBMU Hazardous Spill Notification and Response Plan (BMP 2-12).
- If livestock used to transport material are brought to the stream to drink, then stream bank subject to livestock access will be limited to less than 10% of any stream reach within the project area.
- Water drafting associated with this project will be tracked (length of time, the number of days, and size of pump) and reported at the end of each year to the Water Rights Program Manager. Water drafting sites will be reviewed by a hydrologist or fisheries biologist every two weeks during low flow periods and determinations made regarding adequate minimum flows.

Broadcast burning

- Design underburning prescriptions to avoid adverse effects on soil and water resources by planning prescribed fire to ensure that fire intensity and duration do not result in severely burned soils.
- Flame heights for underburning would not exceed two feet within 25 feet of stream courses or on wetlands unless higher intensities are required to achieve specific objectives. No ignitions will take place within identified stream corridors (i.e. within 25 feet of perennial and intermittent streams). Fire will be allowed to back into these corridors (BMP 6-2 and 6-3).
- Existing roads and trails will be used as fire line to the extent feasible. When line construction is necessary it will be completed with hand tools, to the minimum width and depth necessary to hold the fire. Minimum Impact Suppression Techniques (MIST) will be used. All fire line will be rehabilitated by pulling any berms created back into the line and creating water bars where necessary. Prior to development of the burn plan, consultation with Watershed Specialist will occur to determine the appropriate construction and decommissioning techniques in meadow areas to avoid soil and water quality impacts.

Pile burning in SEZ

- Maintain a minimum 25 foot buffer (no piling or pile burning) from water courses.
- No more than 30% of any SEZ acre may be occupied with piles.
- No more than 15% of any SEZ acre can have burn scars at any time which do not have vegetative recovery (not invasive weeds)
- All burn scars must either 1) have native duff or organic mulch and seed raked into the scar to a minimum of 85% coverage as soon as the burn is completely extinguished, or 2) have native duff or organic mulch and seed raked into the scar to a minimum 85% coverage if the scar does not have vegetative recovery within 2 growing seasons following the burn.
- Burn scars that exceed either a 25 ft diameter or 500 contiguous square ft shall have native duff or organic mulch and seed raked into the scar to a minimum 85% coverage.
- Burn scar raking, whether under option 1) above, or to address large burn scars, must occur as soon as the burn is completely extinguished. In the event the burn scar and surrounding ground is covered by ice or snow, the required raking must occur by June 1 following the burning.
- After initial ignition of piles, but while still burning, allow each pile to be re-piled once (i.e., place large unburned pieces back into the burning pile). Additional re-piling will be allowed if necessary to achieve 80% consumption of the piled material.
- When piles are adjacent to aspen trees, re-piling during pile burning shall be restricted to one time per pile and hot piling is prohibited (i.e. don't feed one pile with the material from other piles or ground material).
- Areas burned within SEZs must be left in a condition such that waste, including ash, soils, and/or debris, will not discharge to a waterbody.

Pile burning in uplands

- Maintain a minimum 25 foot buffer (no piling or pile burning) from water courses.
- Design prescribed fire prescriptions to avoid adverse effects on soil and water resources by planning prescribed fire to ensure that fire intensity and duration do not result in severely burned soils.

Head cut restoration

- Loose dirt and other debris will be cleared from rocks and logs before placing them into channels at head cuts.
- Soil movement within the channel will be avoided during repair of head cuts.
- Exposed bare soil resulting from the repairs will be covered with rock, logs or branches, or will be planted with vegetative material (e.g. willow stakes spaced every 1 ft.).

Scenic / Recreation

- Maintain a distance of a minimum of at least 10 feet, but 25 feet where feasible, between any burn piles and the centerline of designated System trails, including the Pacific Crest Trail and Tahoe Rim Trail, where “lop and scatter” approaches are not feasible to meet project objectives.
- Within 50 feet of the centerline of designated system trails including the Pacific Crest Trail and Tahoe Rim Trail, limit stump height of any cut trees to 6” above ground, measured from the uphill side of the stump, and cut stumps parallel to ground surface.
- Coordinate trail re-route alignment locations with Pacific Crest Trail Association and Tahoe Rim Trail Association.
- Avoid painting of any trees which will not be cut, with exception for treatment boundary trees. Painting will be minimized on boundary trees.
- Notify the Pacific Crest Trail Association and Tahoe Rim Trail Association regarding timing of project activities in proximity to the PCT and TRT respectively. Request that these Associations alert trail users and interested public of planned work, timing, and potential impacts to recreation access and experience via their websites and other communications with their members.
- Post temporary interpretive signs along the PCT and TRT near project activity areas during periods of conifer removal and burning when activity is visible from trail. Remove signage following project activities.
- Schedule treatments to avoid work during Saturdays and Sundays in July and August to minimize disturbance to recreation use and access.
- Prior to project implementation, field identify with Forest Service recreation and/or scenery management specialists any “character trees” within meadows that would be considered for retention to sustain positive scenery values. Character trees may need to be identified with a temporary tag or sign to avoid removal.

Terrestrial Wildlife Resource Protection Measures

Resource protection measures are intended to avoid, eliminate or reduce unintended and undesirable effects of the proposed activities. They are also included to ensure that the project is consistent with the Forest Plan, policy direction, and other laws and regulations. The resource protection measures are also provided in the Biological Evaluation for Terrestrial Wildlife Species, available in the project record.

- Maintain LOPs for threatened, endangered, proposed, candidate species, FSS species, and/or TRPA SIS where it is determined that project activities would otherwise occur within a disturbance or buffer zone. LOPs that would apply to this project based on existing conditions (Feb 2014) that are described below for each meadow. Additional LOPs would be maintained if other species are determined to be breeding in the project area. Current LOPs are based on the LTBMU LRMP (1988), SNFPA (USDA Forest Service, 2004), and TRPA Code of Ordinances

(2013) and are included in Appendix C; if LOPs are updated prior to implementation, the project would maintain the most current LOPs. LOPS may be waived where a biological evaluation concludes that there would be no effects to breeding activities and according to conditions described in SNFPA (USDA Forest Service 2004, e.g., S&G #77, 78, 79, 88).

- Implementation crews will participate in a special status wildlife orientation prior to conducting work in the project area. During project activities, any detection of threatened, endangered, proposed, candidate species, FSS species, or SIS or of nests, roosts, or dens of these species would be reported to the project biologist. These species would be protected in accordance with management direction for the LTBMU.
- Retain known special status species nest/den/roost trees/snags.
- Retain existing and create new coarse woody debris (CWD) for special status wildlife species where retention and creation do not conflict with project objectives and safety. Prioritize retention/creation of the largest size classes and all decay classes represented.
- Retain and create snags in or near meadow perimeters where retention/creation does not conflict with project objectives and safety. Where existing conditions permit, retain/create up to four snags per acre (USDA Forest Service 2004, S&G #11). Prioritize retaining mid- and large-diameter snags with complex structure, potential cavities, and in a range of decay classes.
- Identify some mid- and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) that could be retained to serve as future replacement snags and to provide nesting structure (USDA Forest Service 2004, S&G #11).
- All trash created during construction will be properly contained in bear-resistant containers and removed at the end of each day. No trash will be left overnight on site.
- If marten den sites are identified in the project area, apply the LOP as described in Appendix C. If vegetation treatments would occur within marten den site buffers within the meadow buffer zones and outside the LOP (359 meter radius around known den sites) , treatments should result in (where existing conditions permit) at least: 1) two conifers per acre greater than 24 inches dbh with suitable denning cavities, 2) canopy closures exceeding 60 percent, 3) more than 10 tons per acre of coarse woody debris in decay classes 1 and 2, and 4) an average of 6 snags per acre on the Westside and 3 per acre on the eastside (USDA Forest Service 2004, pg. 39).
- Additional Resource Protection Measures for Baldwin, Benwood, Hellhole, Freel, and Meiss Meadows:
 - a. Where willow clipping is conducted, this activity should take place in a random fashion, taking more from larger clumps and less from smaller clumps. Clipping in a single willow clump should not be great enough to alter the visual shape or the overall structure of the clump. No branches attached to a bird nest or within one meter of any part of a bird nest should be clipped.
 - b. Although fire can stimulate willow growth, prescribed burns should not burn all willows in a meadow. Prior to prescribed burns a biologist will flag any willows that have been willow flycatcher nest sites or larger-sized, mature willows that should be retained.
 - c. Conduct willow flycatcher surveys the same year as implementation (if implementation begins after mid-July) or the year before implementation activities. If willow flycatcher is detected, nests would be protected in accordance with the USDA Forest Service (2004) and LOP as described in Appendix C.
- Additional Resource Protection Measures for Baldwin Meadow:
 - a. Maintain LOPs for threatened, endangered, proposed, candidate species, FSS species, and/or TRPA SIS where it is determined that project activities would otherwise occur within a designated disturbance zone. LOPs that would apply at Baldwin Meadow based on existing conditions (Feb 2014) include mapped bald eagle wintering area, waterfowl management area and osprey nest sites, and possible willow flycatcher nest sites.

- b. Do not conduct tree removal activities between mid-October and June 30th to maintain a low level of human disturbance for wintering bald eagles (mid-October to February) and waterfowl (March 1 to June 30). If project objectives can still be met and safe conditions exist, conduct prescribed burning outside of this time period. If prescribed burning occurs during this time period, prioritize burning activities before mid-October or after February. Minimize the number of ignition days and provide burn crews with a sensitive species awareness training prior to burning activities.
- c. To maintain visual screening and vegetation for waterfowl, do not conduct prescribed burning within 25 feet of stream corridors and marsh areas.
- d. Implementation of tree removal and prescribed fire in mapped bald eagle wintering habitat would be designed to retain all known perch and roost trees/snags. Where existing conditions permit, retain an average of six snags per acre larger than 20 inches dbh in variable decay classes. Retain large diameter (larger than 20 inches) trees where existing conditions permit and project objectives can be met.
- e. Implementation of tree removal and prescribed fire within osprey disturbance zones (1/4 mile surrounding known nests) would retain all known standing osprey nest trees and where existing conditions permit, retain an average of three trees per acre that are larger in diameter and taller than the dominant tree canopy, with an emphasis on dead topped trees with robust, open branch structures.
- Additional Resource Protection Measures for Benwood Meadow:
 - a. For treatments in the buffer zone that overlap California spotted owl Home Range Core Areas (HRCA), conduct vegetation treatments that result in at least (or as closely as possible, where existing vegetation conditions permit): 1) two tree canopy layers; 2) dominant and co-dominant trees with average diameters of 24 inches dbh; 3) 50 to 70 percent canopy cover; 4) an average of three to six snags (three in eastside pine and mixed conifer, four in Westside pine and mixed conifer, and six in red fir forest types) per acre larger than 20 inches dbh and of variable decay classes; and 5) 10 tons of coarse woody debris per acre larger than 20 inches in diameter (at the large end) and of variable decay classes.
 - b. Because implementation could occur within 0.25 mile of a spotted owl PAC (Hawley Grade), surveys would be conducted two consecutive years before implementation to identify if project activities would occur within 0.25 miles of a nest. Surveys can be conducted the year before and the year of project implementation if implementation begins after mid-August. If a nest is identified within 0.25 mile of project activities, the LOP would apply (Appendix C).
- Additional Resource Protection Measures for Meiss Meadow:
 - a. Avoid re-routing trails through willow flycatcher emphasis habitat.

Botanical Resource Protection Measures

The following resource protection measures are designed to adequately protect federally threatened, endangered, proposed, and candidate and Forest Service sensitive (TEPCS) botanical species (plants, lichen, fungi) and other botanical resources such as LTBMU watch list botanical species, special habitats, and uncommon plant communities. Maps of occurrences as well as the resource protection measures are also provided in the Biological Evaluation for Botanical Species as well as the project plant protection plan, available in the project record.

The hydrological processes that maintain fens, meadows, and associated TEPCS botanical species are threatened by conifer encroachment. Therefore, the proposed activities are considered beneficial for these areas and will be allowed with certain restrictions in ‘botanical treatment areas.’ These are distinguished from control areas, where all project activities are excluded.

For botanical resource RPMs, ground disturbance is any work or activity that disturbs or displaces soil or ground cover; activities include, but are not limited to, fireline construction, tree stump removal, material removal (e.g. soil, rock, gravel, wood), soil excavation, and staging equipment and materials.

1. *Bruchia bolanderi* (Bolander’s candle-moss)—Occurrences will be designated as ‘botanical treatment areas’ where all ground disturbing activities will be excluded. Other project activities are allowed with the following restrictions:
 - a) Botanical treatment areas will be identified on project maps and flagged prior to implementation.
 - b) Piles will not be constructed or burned within 20 ft of plants.
 - c) Ignition and construction of fireline is prohibited.
 - d) Foot traffic is minimized.
 - e) Supplemental willows will not be planted.
 - f) Manipulation of fuels to reduce impacts to individuals during prescribed fire treatments is allowed.
2. *Pinus albicaulis* (whitebark pine)— If project activities occur in whitebark pine stands the following restrictions apply:
 - a) Piles will not be constructed or burned within 10ft of whitebark pine
 - b) Individual trees or clusters of trees with at least one tree 18” dbh or greater will be retained
 - c) Clusters of trees consisting of at least two trees 12” dbh or greater will be retained
 - d) Trees may be removed, if dead or displaying evidence of pathogens or disease
 - e) Exceptions for safety are allowed
 - f) Where removal of whitebark pine is necessary for meeting project objectives the order of preference for removal will be based on the following:
 - i. Signs of insects or disease or overall decline in health
 - ii. Small suppressed trees
 - iii. Trees growing in clumps that consist of less than 3 stems
 - iv. Individual trees or clumps of trees with at least one tree 18 inches dbh will be retained
 - v. Clumps of trees consisting of at least two trees 12 inches dbh will be retained
3. If additional occurrences of above listed TEPCS botanical species are discovered prior to or during project implementation, they will be protected as directed above. If occurrences of other TEPCS botanical species are discovered prior to or during project implementation, they will be flagged and avoided until supplemental environmental analysis can be conducted (e.g. Supplemental Information Report, Letter To File).
4. Fens (special habitat):
 - a) Project design and operations will improve or maintain the hydrologic processes that sustain water flow, water quality, water temperature, and hydrological connectivity that is critical to sustaining those fens potentially affected by proposed actions.
 - b) Fens will be designated as ‘botanical treatment areas’ where all ground disturbing activities will be excluded, but in which other project activities allowed with the following restrictions:
 - i. Botanical treatment areas will be identified on project maps and flagged prior to implementation
 - ii. Foot traffic is minimized within botanical treatment area.
 - iii. Felled trees will not be dragged through botanical treatment area.
 - iv. Piles will only be located in areas designated by a staff botanist or ecologist prior to implementation. In general, pile construction will be minimized in fens and piles will be focused in portions of fens that are previously disturbed, not perennially saturated, or do not exhibit peat-forming vegetation.
 - v. Ignition and construction of fireline is prohibited within botanical treatment area.
 - vi. Supplemental willows will not be planted within botanical treatment area.

- c) If conifer removal/thinning and/or prescribed burning treatments are conducted in a fen, then the fen will be monitored pre- and post-project implementation, unless there is sufficient evidence to support that the treatment will not adversely impact the fen.

Invasive Plant Prevention Measures

The following measures will be implemented to reduce the risk of invasive plant establishment and spread associated with proposed activities. Site-specific invasive plant management measures are provided in the plant protection plan and invasive plant risk factors are also documented in the project's Invasive Plant Risk Assessment, available in the project record.

1. **Inventory & Identification**—Project areas and adjacent vectors—particularly access roads—will be inventoried for invasive plants within five year of implementation. Invasive plant infestations will be identified on project maps and flagged.
2. **Staging areas**—Do not stage equipment, materials, or crews in invasive plant-infested areas. Staging areas will be identified prior to project implementation.
3. **Control Areas**—Where feasible, invasive plant infestations will be designated as Control Areas—areas from which all project activities are excluded or treated prior to implementation. Control Areas will be identified on project maps and delineated in the field with flagging. Infestations found in the project area during implementation will be treated as control areas or treated prior to implementation.
4. **Project-related disturbance**—Minimize the amount of ground and vegetation disturbance in staging and construction areas. Where feasible, reestablish vegetation on disturbed bare ground to reduce invasive species establishment; revegetation is especially important in staging areas.
5. **Post Project Monitoring**—After the project is completed the Forest Botanist should be notified so that the project area can be monitored for invasive plants subsequent to project implementation (as funding allows).
6. **Mulch and topsoil**—Use weed-free mulches and topsoil. Salvage topsoil from project area for use in onsite revegetation, unless contaminated with invasive species. Do not use material from areas contaminated by cheatgrass.
7. **Livestock**—If supplemental fodder (e.g. hay) is required for livestock, including horses and other pack animals, it will be certified weed-free.
8. **Revegetation**—
 - a) Plant materials must be approved the Forest Botanist or their designated appointee who has knowledge of local flora.
9. **Project Specific Control areas**—The following infestations will be designated as control areas from which all project activities will be excluded: Canada thistle site 736B in Baldwin Meadow.
10. **Project Specific Treatment**—All invasive plant infestations will be treated prior to and in the same growing season as project implementation. Treatment will occur in accordance with Forest Service management direction and the design features of the LTBMU 2010 Terrestrial Invasive Plant Species Treatment Project Environmental Assessment (TIPS EA). If treatment is not feasible or as needed according to the species present and project constraints, infestations will be flagged and designated as control areas. The Project Leader will notify the Forest Botanist or their designated appointee prior to project initiation to coordinate invasive plant treatment. GIS layers will be provided to the Project Leader prior to project implementation.
 - a) Canada thistle (*Cirsium arvense*): Canada thistle is known at one location within Baldwin meadow (736B). The site will be treated at least two weeks prior to project implementation. Chemical treatment using aminopyralid is the preferred treatment option. However, manual treatment—clipping buds or digging up plants—may be used to control small infestations.
 - b) Bull thistle (*Cirsium vulgare*): Bull thistle is known at 11 locations within Baldwin meadow (267, 703, 718, 720, 729, 731, 736A, 755, 756A, 757, 790A). Bull thistle will be treated at least one week prior to project implementation. Treatment options include, but are not limited to, manual removal by a) digging out as much of the root as possible and either bagging the plant or laying it

out where the roots will not be in contact with the ground; and b) if in bud or flowering, clipping and bagging all buds and flowers.

- c) Oxeye daisy: Oxeye daisy is known at two locations within Baldwin meadow (756B, 790B). These sites will be treated at least two weeks prior to project implementation. Chemical treatment using aminopyralid is the preferred treatment option. However, manual treatment—by hand pulling or digging up all rhizomes and bagging plants for disposal—may be used to control small infestations

Cultural Resources

Approved Standard Protection Measures (as defined by Appendix E of the Region 5 Programmatic Agreement for compliance with Section 106 of the National Historic Preservation Act) will be applied to ensure the Forest has taken into account the effect of this undertaking on historic properties. The following measures will be implemented to reduce the risk of impacting historic properties.

- Fifteen sites, for a total of 17 acres were identified (Table 2-3). All of these archaeological/historic sites can be approved for vegetation reduction treatments within the site boundaries as long as the following Standard Resource Protection Measures are implemented, as outlined in the Region 5 Programmatic Agreement.
 - Flag and avoid known sites during implementation.
 - Hand thinning could occur within the site boundaries with no dragging of materials, and no piling within site boundaries. Determine if the tree can be felled with minimal ground disturbance, then after felling - buck up the tree and remove from the site by hand (no dragging)
 - Certain features would require heritage staff be present during implementation to monitor work within site boundaries and pile burning adjacent to sites.
 - No burning will occur within site boundaries. Fire lines or breaks may be constructed off sites to protect at risk historic properties in order to avoid spread from piles; create hand lines outside of the boundaries prior to prescribed burns, black line the hand line first if possible.
 - Fire crews or HPM staff should monitor sites to provide protection as needed to make sure accidental ignition of wooden historic structures does not occur at the Ebright Dairy (Baldwin meadow) and Meiss Cabin/Barn (Meiss Meadow).
 - Vegetation may be removed and fire lines or breaks may be constructed within sites using hand tools, so long as ground disturbance is minimized and features are avoided, as specified by the HPM.
 - Fire shelter fabric or other protective materials or equipment (e.g., sprinkler systems) may be utilized to protect Ebright Dairy (Baldwin Meadow) if needed.
 - Trees which may impact at risk historic properties should they fall on site features and smolder can be directionally felled away from properties prior to ignition, or prevented from burning by wrapping in fire shelter fabric or treating with fire retardant or wetting agents.
 - Vegetation to be burned shall not be piled within the boundaries of historic properties unless the location (e.g., a previously disturbed area) has been specifically approved by the Forest's HPM.
- Buffer zones may be established to ensure added protection where the Heritage Program Managers determine that they are necessary. The size of buffer zones will be determined by HPMs or qualified Heritage Program staff on case-by-case basis. Use of buffer zones in avoidance measures may be applicable where setting contributes to property eligibility under 36 CFR 60.4 or where setting may be an important attribute to an historic property. (For this project, the Meiss Cabin, Barn and Corral complex is the only property where buffers may be needed.)

- Landscape architects and qualified Heritage Program staff will be consulted to determine appropriate view sheds for historic resources at Meiss Cabin.
- If cultural or archaeological resources are discovered during project implementation, stop all work in the vicinity until cleared by a professional cultural resources manager.

Table 2-3: Number and total acres of heritage sites by meadow.

Meadow	Benwood	Freel	Hellhole	Star	Meiss	Baldwin	Totals
No. of Sites	0	2	0	1	11	1	15
Total Acreage	0.0	1.39	0.0	1.58	6.39	7.72	17.08

Vegetative Resources

- Stand cards describing site specific resource protection measures will be completed prior to individual meadow implementation.
- Sporax would be used on cut stumps greater than 14 inches diameter in the buffers. No sporax will be used within any of the meadows. No sporax would be used within 25 feet of standing or running water. Sporax would not be used during rainfall events to avoid washing off target stump surfaces. The use of Sporax in Hell Hole would be coordinated between the aquatic biologist and vegetation specialist.
- Thinning that occurs on the meadow edge to reduce the impacts of conifer encroachment/seed sources may reduce basal area of conifers to less than 40% of existing conditions to reduce impacts of conifer encroachment.
- Thinning that occurs within the forest to ensure that fire can be safely and effectively introduced into proposed meadows will retain at least 40% of existing basal area.
- Conifer canopy cover would likely be reduced by more than 30 percent to reduce impacts of conifer encroachment to meadow. In forest thinning, canopy cover will not be reduced by more than 30% within treatment unit.
- For willow planting, site preparation will disturb only enough of the ground cover (grasses, forbs, shrubs and litter) to provide a planting bed.

Air Quality

A burn plan will be prepared and reviewed by the Lake Tahoe Basin Management Unit Forest Fire Managements Officer prior to implementation. The Burn Plan will include a Smoke Management Plan which is the basis for obtaining a permit with Eldorado Air Quality Management District. In order to minimize the effects of prescribed burning on air quality; monitoring, mitigation and contingency measures will be identified in the Smoke Management Plan. Desirable meteorological conditions such as favorable mixing height and transport wind speeds are required in the Smoke Management Plan to facilitate venting and dispersion of smoke from populated areas.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives.

Table 2-4. Comparison of Project Components by Alternative

Implementation tool*	Alt. 1	Alt. 2 (Proposed Action)						
		Baldwin	Benwood	Freel	Hell Hole	Meiss	Star	Total
Conifer Removal (meadow only)	0	33 acres	16 acres	8 acres	42 acres	122 acres	7 acres	228 acres
Conifer Thinning (buffer only)	0	0	43 acres	29 acres	0	244 acres	43 acres	359 acres
Prescribed Fire - Pile Burn	0	33 acres	59 acres	37 acres	42 acres	366 acres	50 acres	587 acres
Prescribed Fire - Broadcast Burn	0	121 acres	70 acres	50 acres	0	342 acres	56 acres	639 acres
Lop and Scatter	0	121 acres	70 acres	50 acres		529 acres	56 acres	826 acres
Head cut repair	0	1.2 miles	0.1 miles	0.1 miles	0	1.6 miles	40 ft^	3 miles
Re-establishment of Meiss Corral	0	0	0	0	0	0.1 acres	0	0.1 acres
Willow Planting	0	7.3 acres	5.5 acres	1.6 acres	8.4 acres	0	0	22.8 acres
Trail Reroute	0	0	0	0	0	1.1 miles reroute, 1.1 miles decommission	0	2.2 miles

*How each implementation tool was calculated: Each value in the table is the maximum acres/miles that would be implemented, in many cases the treated area would be less than the maximum. *Conifer Removal/Thinning*: was calculated using 1 meter 2010 digital ortho imagery from the National Agriculture Imagery Program (NAIP). Area of conifers seen with the imagery in each meadow was calculated and added to the area of the buffers. Most conifer removal in the meadow would be seedlings/saplings and within the buffer conifers will be thinned. See NAIP imagery maps for each meadow. *Prescribed Fire - Pile Burn*: was calculated using the total area calculated for conifer removal, with the assumption that piles would only be piled in areas where conifer removal was occurring. *Prescribed Fire - Broadcast Burn* and *Lop and Scatter*: These were calculated as the total area of the meadow and buffer. *Head cut repair*: was calculated as the total length of channel within the meadow; however head cut repair will be on isolated segments of the total channel so this number will be substantially lower. ^Star meadow head cut is from a spring/seep – there is not a perennial channel through the meadow. *Re-establishment of Meiss Corral*: The current extent would be the target area for Meiss Corral, this is smaller than the historic extent. *Willow Planting*: In meadows with emphasis habitat the total area of emphasis habitat that falls within the project area is presented (Baldwin and Hell Hole). In meadows within 2 miles of emphasis habitat 20% of the meadow area was identified (Benwood and Freel). *Trail Reroute*: this is the length of reroute and decommissioned trail.

Table 2-5. Summary of Direct and Indirect Environmental Consequences by Resource and Alternative.

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)
Aquatic Wildlife	Alternative 1 (no action) would avoid effects to all focal species and their habitat. However, it would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity. All of which are the long-term effect of human disruption of the natural condition in the Lake Tahoe area. Alternative 1 would forego the opportunity to correct some of these long-term effects and leave meadows on their current trajectory.	Alternative 2 (proposed action) could cause short-term disturbance to species present in the Action Areas as well as habitat. However, long term effects achieved by removing conifers, reestablishing a natural fire regime and addressing small head cuts would increase the quality and quantity of habitat for focal aquatic species. Overall, Alternative 2 would have a greater benefit to aquatic species and to aquatic habitats in the LTB.
Botanical	Alternative 1 (no action) avoids short-term direct negative effects to botanical resources, but non-implementation is expected to degrade meadow, fen, and upland habitat in the long-term.	Alternative 2 (proposed action) could result in direct negative effects to some botanical resources, but is expected to improve meadow, fen, and upland habitat in the long-term.
Cultural	Alternative 1 (no action) will result in little change to the condition of prehistoric and historic sites within the project area. Ebright Dairy historic site will continue to be in a state of ruins, Meiss Cabin and Barn will continue to be preserved as before, but the Meiss Corral will not be rebuilt and erosion will continue around the lodgepoles near the cabin which are currently used to tie up horses. Prehistoric sites might be impacted by expanding head cuts, but no sites are currently thought to be threatened by head cuts.	Alternative 2 (proposed action) would have the positive effect of the Meiss Cabin Corral being rebuilt using lodgepole logs that will be produced by the project. The head cut repairs will stabilize stream banks and could possibly prevent erosion that could impact prehistoric and historic sites. Any negative impacts to cultural resources during project implementation can be avoided by employing standard resource protection measures.
Forest	Under Alternative 1 (no action), conifer forests	Alternative 2 (proposed action) would result in stand

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)
Vegetation	would continue to increase in stand densities both by recruitment and growth of existing trees. In areas where the stand densities are already high and either at or approaching maximum occupancy for the forest type, there would be a reduction in growth and vigor and increase in mortality. Trees would become more stressed and more susceptible to insects and disease.	conditions more similar to conditions that would have existed without fire suppression. The removal of lodgepole pine and white fir and preferential retention of Jeffrey pine would help to restore historic species composition. Conifer forests located at higher elevations would have little need for tree removal given the already open condition of most of the stands. The removal of any whitebark pine would be minimized and with all tree species, the reduction of stand densities would improve in overall health and vigor due to the increased availability of sunlight, moisture, and nutrients.
Hydrology and Soils	Alternative 1 (no action) will not result in conifer removal from meadows in the project area, or head cut repair. Conifer encroachment and head cut propagation will continue to negatively affect meadow conditions, leading to further meadow drying and possibly continued water quality effects from channel bed and bank erosion	Implementation of the project resource protections measures is expected to avoid impacts to stream channels and soil and water quality from project activities. This project will stabilize head cuts in the specific meadows listed above, reducing bank and bed erosion and improving water quality downstream.
Invasive Plants	There would be no change in invasive plant risk from current management activities.	Overall, the anticipated invasive plant response to the project is low. There is a low risk from non-project vectors and known infestations and the habitat vulnerability is relatively low at all but Baldwin Meadow. The proposed activities represent a low risk of introduction or spread and habitat alternation is expected to be minimal.
MIS	No change in habitat types.	For all habitat types and ecosystem components analyzed for this project, except Mid Seral Coniferous Forest, Alternative 2 would have more benefit than Alternative 1. A very small amount of Mid Seral Coniferous Forest could potentially be lost due to Alternative 2. However the gain in the other habitat types is a greater benefit to MIS species as a whole than the loss of Mid Seral habitat is

Resource	Alternative 1 (No Action)	Alternative 2 (Proposed Action)
Recreation	Alternative 1 (no action) would not result in any change to the current recreation opportunities or access in the project areas.	detrimental. Alternative 2 (proposed action) would have temporary recreation impacts to access, but would improve the recreation experience overall.
Scenic	Alternative 1 (no action) would not result in direct effects to scenic resources, however indirect effects include risks to scenic stability and potential long-term loss of valued scenic attributes associated with meadow vegetation. Alternative 1 would be consistent with the adopted VQO of retention.	Alternative 2 (proposed action) would negatively affect scenic resources in the short-term primarily as a result of management activity including tree removal, and prescribed pile and broadcast burning. These and other management activities would be visually evident during and immediately following implementation but their visibility would diminish over time. Meadows with trail access or proximity to trails, or within recreation sites (Baldwin, Benwood, Freel, and Meiss meadows) have the greatest visibility, and are most sensitive to the short-term effects of management activities.
Terrestrial Wildlife	Alternative 1 (No Action) would avoid effects to all focal species and their habitat. However, Alternative 1 would also forego the opportunity to correct some long-term effects.	Alternative 2 (proposed action) would cause disturbance type effects to all species present in the action areas. Species that avoid the action areas during implementation would be expected to return when implementation (i.e. disturbance) is complete. All focal species, if determined to be nesting, denning or roosting (bats) in the project action areas would be protected in order to avoid impacts to these species. While some habitat would be degraded or removed (goshawk, spotted owl, marten), this removal would result in improved habitat for other species (willow flycatcher, bats, Western bumble bee, mule deer, and waterfowl). Willow planting and head cut repair will further improve wet meadow habitat, which is a severely limited habitat in the LTB. Overall, Alternative 2 would have the larger benefit to the greater number of species and to wet meadow habitats in the LTB.

Chapter 3: Affected Environment and Environmental Consequences

This section summarizes the physical, biological, social and economic environments of the affected project area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

Introduction

The Council on Environmental Quality (CEQ) regulations directs that agencies succinctly describe the environment that may be affected by the alternatives under consideration (40 CFR 1502.15). This chapter describes the existing physical, biological, social, and economic aspects of the project area that have the potential to be affected by implementing any of the alternatives (i.e., the existing conditions). Each description of the existing conditions is followed by a description of the environmental effects (direct, indirect, and cumulative) that would be expected to result from undertaking the proposed action or other alternatives. Together, these descriptions form the scientific and analytical basis for the comparison of effects table found at the end of Chapter 2, “Alternatives, Including the Proposed Action.”

Organization of Chapter 3

Chapter 3 combines information on the existing conditions and environmental effects of the alternatives for the various resources. The information is separated into these resource areas for ease in reading. The discussion of alternatives is organized by resource area, and each resource area is presented as follow:

Introduction. The scope of the analysis briefly describes the geographic area(s) for the individual resource and its indicators potentially affected by implementation of the proposed action or alternative. The scope of the analysis varies according to individual resource area and may also vary for direct, indirect, and cumulative effects.

Existing Conditions. The existing conditions section provides a description of the resource environment that is potentially affected based on current resource conditions, uses, and management decisions.

Direct, Indirect, and Cumulative Effects. This section provides an analysis of direct, indirect, and cumulative environmental effects on the resource area by implementing each of the alternatives, according to the indicators and issues identified for that resource.

Direct effects are caused by the actions to implement an alternative, and occur at the same time and place. Indirect effects are caused by the implementation action and are later in time or removed in distance, but are still reasonably foreseeable (i.e., likely to occur within the duration of the project).

Cumulative effects are the result of the incremental direct and indirect effects of any action when added to other past, present, and reasonably foreseeable future actions. Cumulative effects can

result from individually minor, but collectively significant actions, taking place over a period of time.

Projects Considered for Cumulative Effects

A cumulative effect is the effect on the environment that results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant. (40 CFR 1508.7, 1508.8). Cumulative effects can result from individually minor, but collectively significant actions, taking place over a period of time. Appendix D summarizes the environmental consequences of past, present, and future projects within the project area.

Cumulative effects are commonly confused with indirect effects. The cumulative effects analysis for each resource takes a look at the other past, present and foreseeable future actions: by the Forest Service as well as other agencies.

- *Cumulative effects*, generally speaking, are those additive effects to resources on the landscape from:
 - 1) the actions proposed in this project (as an additive effect) when combined with
 - 2) the effects of:
 - a) past projects,
 - b) currently active projects, and
 - c) projects that are planned in the foreseeable future.

This analysis relies on *current environmental conditions* as a proxy for the *impacts of past actions*. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment (and might contribute to cumulative effects). While some of the recent past actions are identified and summarized in Appendix D, the cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach.

1. A catalog and analysis of all past actions would be impractical to compile – and unduly costly to obtain. Current conditions within the project area have been impacted by innumerable actions over the last century (and longer); attempting to isolate the individual actions that continue to have residual impacts would be nearly impossible.
2. Providing the details of past actions, on an individual basis, would not be useful to predict the cumulative effects of the proposed action or alternatives. In fact, focusing on individual actions would be less accurate than looking at existing conditions because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions can risk ignoring the important residual effects of past natural events, which also contribute to cumulative effects. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects.
3. Public scoping for this project did not identify any public interest or need for detailed information on individual past actions.

4. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, “agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions” (Connaughton 2005).

The cumulative effects analysis in this EIS is consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

“CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives will add to, modify, or mitigate those effects. The final analysis documents an agency assessment of the cumulative effects of the actions considered (including past, present, and reasonable foreseeable future actions) on the affected environment. With respect to past actions, during the scoping process and subsequent preparation of the analysis, the agency must determine what information regarding past actions is useful and relevant to the required analysis of cumulative effects. Cataloging past actions and specific information about the direct and indirect effects of their design and implementation could in some contexts be useful to predict the cumulative effects of the proposal. The CEQ regulations, however, do not require agencies to catalogue or exhaustively list and analyze all individual past actions. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision making. (40 CFR 1508.7)”

The *reasonably foreseeable future actions* used in the cumulative analysis are limited to projects that are funded and have progressed in the planning stages sufficiently to clearly identify the anticipated direct and indirect environmental effects. Projects where the implementation may take place at some undefined point in the future and/or have unformed proposed actions which do not yet have specific environmental consequences cannot be reasonably included in the analysis.

Stated simply, if the specific location, action, direct and indirect effects, and timing cannot be predicted with some degree of certainty, then including that project in the analysis is only speculative – which may lead to inaccurate cumulative effects analyses. Future actions are only included if their impacts are forecasted to occur before the impacts of the proposed action have ended.

Aquatic Wildlife Habitat and Species

Introduction

The purpose of this analysis is to evaluate and disclose the potential effects of the two alternatives for the Restoration of Fire Adapted Ecosystems Project on USDI Fish and Wildlife Service (FWS) aquatic wildlife species protected under the Endangered Species Act (ESA) and Forest Service Sensitive (FSS) aquatic wildlife species and habitat. Aquatic Management Indicator Species (MIS) are addressed in the MIS section of this EA. Tahoe Regional Planning Agency (TRPA) Special Interest Species (SIS) are addressed in the Terrestrial Wildlife section of this EA. The two alternatives under consideration (1 and 2) are described in Chapter 2. For additional information refer to the project's Biological Assessment and Biological Evaluation for Aquatic Wildlife Species, available in the project record.

The goal (desired condition) of this project is to improve condition of six selected meadows to encourage movement toward the natural range of variability. This restoration approach supports adaptations to changing future conditions, such as changing climate. Alternatives briefly described in this chapter discuss the degree to which each alternative aids in the achievement of this goal; specifically in relation to aquatic habitat and the special status associated with that habitat.

Methodology

The scope of analysis for aquatic resources covers fish, amphibians and invertebrates, and their associated habitats including: streams, lakes, wetlands and meadows. The aquatic resources analysis is driven by both Forest Service and other federal policies, which include various goals to conserve and/or protect species and habitat.

The following aquatic species and their Federal and State listing status⁷ that are specifically addressed in this analysis are:

- **Lahontan Cutthroat Trout** (*Oncorhynchus clarkia henshawi*)
Endangered Species Act (ESA) Listing Status: *Threatened*
US Forest Service, Region 5 Status: *None*
- **Sierra Nevada Yellow-legged Frog** (*Rana sierrae*)
ESA Listing Status: *Federally Endangered with Proposed Critical Habitat*
US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*
- **Yosemite Toad** (*Bufo canorus*)
ESA Listing Status: *Federally Threatened*
US Forest Service, Region 5 Status: *None*
- **Lahontan Lake Tui Chub** (*Gila bicolor pectinifer*)
ESA Listing Status: *None*
US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*
- **Great Basin Great Basin rams-horn** (*Helisoma newberryi*)
ESA Listing Status: *None*
US Forest Service, Region 5 Status: *Regional Forester's Sensitive Species*

Of the aquatic species listed above, only Lahontan cutthroat trout (LCT) and Sierra Nevada yellow-legged frog (SNYLF) have been detected within the project area and action area. No

surveys were conducted for Great Basin rams-horn. Habitat for some of the species listed above does occur in the project area (Table 3-1).

Table 3-1: Aquatic species listed for the Lake Tahoe Basin Management Unit noting if they occur and/or have suitable habitat within the project and/or analysis area.

SPECIES	STATUS	HABITAT CHARACTERISTICS	POTENTIAL HABITAT PRESENT?	RATIONALE
Fish				
Lahontan lake tui chub (<i>Gila bicolor pectinifer</i>)	FSS	Large, deep lakes of the Lahontan basin. Algal beds in shallow, inshore areas for spawning, egg incubation, larval rearing.	Yes	Tui chub may spawn in the near shore areas of Lake Tahoe or mouths of rivers such as Tallac Creek located in Baldwin Meadow.
Lahontan cutthroat trout (<i>Oncorhynchus clarki henshawi</i>)	FT	Lakes and streams of the Lahontan basin.	Yes	Occupied habitat occurs within the Action Area, Meiss Meadow. Suitable physical habitat occurs in Baldwin Meadow, yet limited by the presence of non-native species.
Amphibians				
Sierra Nevada yellow-legged frog (<i>Rana sierrae</i>)	FSS, FE, PX	Inhabits ponds, tarns, lakes, and streams at moderate to high elevations.	Yes	Suitable physical habitat present in all meadows. Occupied habitat occurs at Hellhole meadow. No other detections have occurred at other meadows within the project/action area.
Yosemite toad (<i>Bufo canorus</i>)	FT	High elevation, open, montane meadows with permanent water sources	Potential	The Lake Tahoe basin is not in the historic range of Yosemite toad. No detections to date.
Invertebrates				
Great Basin rams-horn (<i>Helisoma newberryi</i>)	FSS	Larger lakes and slow rivers, including larger spring sources and spring-fed creeks. Snails burrow in soft mud.	Yes	Great Basin rams-horn may be present in in springs inside the project area, but surveys have not been conducted.
Status explanations: FSS = LTBMU Sensitive Species, Regional Forester's Sensitive Species List, Region 5 Federal List (USFWS): FC = Candidate for listing; FE = Endangered; FT = Threatened; P = proposed for listing as endangered (E) or threatened (T); (PX) Proposed Critical Habitat Sources: CDFW 2008; USFWS 2013; USDA Forest Service 2008				

Management Indicator Species

Management indicator species (MIS) for the LTBMU are identified in the 2007 Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment (USDA Forest Service 2007). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS (see the MIS Report in the Project Record). The aquatic MIS selected for project-level MIS analysis for the Restoration of Fire Adapted Ecosystems Project are: aquatic macroinvertebrates (Riverine & Lacustrine) and Pacific tree frog (Wet Meadow). Aquatic MIS along with Terrestrial MIS selected for project-level analysis are discussed in the MIS section of this EA.

Analysis Area

The Restoration of Fire Adapted Ecosystems Project area is located on the south end of the Lake Tahoe Basin in the eastern Sierra Nevada mountain range. Elevations in the project area range from 6,224 feet to approximately 9,300 feet. The majority of the project area is located within meadow environments or a buffer area defined for this project surrounding the meadows. The project area including the buffers is referred to as the Action Area. Within the 892 acre Action Area, there are 590.7 acres of Riparian Conservation Areas (RCAs), 472.4 acres of Stream Environment Zones (SEZs), 520 acres of suitable habitat for Sierra Nevada yellow-legged frog (SNYLF, *Rana sierrae*), and 14.4 miles of perennial stream (Table 3-2). The Action Area for each meadow includes a treatment buffer and encompasses all aquatic habitat potentially affected by proposed project activities. Only Meiss Meadow includes additional aquatic habitat outside the buffered treatment area (about 10 additional miles of perennial stream). Because Meiss Meadow contains LCT occupied stream habitat and LCT occur downstream from the project area, an additional 10 stream miles will be analyzed.

- RCAs are defined by the Sierra Nevada Forest Plan Amendment (SNFPA) surrounding streams, special aquatic features and other hydrological depressions (USDA Forest Service, 2004). The RCA width is dependent on the stream or feature type rather than soils or vegetation present in the area. The RCA width for perennial channels is 300 feet on either side of the stream (measured from the bankfull edge of the channel), and for intermittent and ephemeral channels is 150 feet on either side of the stream. The RCA width surrounding lakes, fens and springs is 300 feet from the edge of the feature.
- SEZs are defined by TRPA and the Lahontan Regional Water Quality Control Board (Lahontan Water Board) as biological communities that owe their characteristics to the presence of surface water or a seasonally high groundwater table. The criterion for defining SEZs includes indicators of vegetation, hydrology, and/or soil type (WQCP, 1995).
- Suitable habitat for SNYLF is defined by the FWS and Forest Service Region 5 as permanent water bodies or those hydrologically connected with permanent water such as wet meadows, lakes, streams, rivers, tarns, perennial creeks, permanent plunge pools within intermittent creeks, and pools, such as a body of impounded water contained above a natural dam. SNYLF have been observed using surrounding uplands up to a distance of 82 feet. When water bodies occur within 984 feet of one another, as is typical of some high mountain lake habitat, suitable habitat for dispersal and movement includes the overland areas between lake shorelines. In mesic areas such as lake and meadow systems, the entire contiguous or proximate areas are suitable habitat for dispersal and foraging.

Table 3-2: Restoration of Fire Adapted Ecosystems proposed treatment acres and stream miles within the Analysis Area.

Meadow	Proposed Action Area Acres ¹	Proposed SNYLF Suitable Habitat Acres	Proposed RCA Treatment Acres	Proposed SEZ Treatment Acres	Perennial Stream Length (mi)
Baldwin	121	96	32.2	121	1.5
Benwood	70	36	40	22.5	0.3
Freel	50	33	45.7	19	0.1
Hellhole	66	50	69	29.3	0.5

Meiss	529	276	347	280.6	12 ²
Star	56	29	56.8	0	0
Totals	892	520	590.7	472.4	14.4
¹ Action Area: the project area and buffers. ² The analysis of impacts to aquatic habitat and species includes 10 additional miles of perennial stream for Meiss Meadow because this area contains LCT occupied stream habitat and LCT occur downstream from the project area.					

Assumptions

In the analysis for this resource, the following assumptions have been made:

Conservation measures that will be finalized in the Programmatic Biological Opinion for SNYLF will be included in Resource Protection Measures for Restoration of Fire Adapted Ecosystems project, if not included already.

Overview of the Affected Environment

Aquatic Habitat

The meadows and associated aquatic habitat included in this action area are in a degraded condition due to conifer encroachment, the presence of channel head cuts, and poorly located trail segments. Past land use/management (e.g. fire suppression, grazing, and trail construction) and recurrent droughts have impaired the natural function and processes of many meadows in the LTBMU, specifically the six meadows proposed for restoration under this project.

Fire suppression activities have likely changed the frequency of fire in all six of the meadows selected for restoration under this project. In addition, suppression activities have increased the density of conifers at the meadow boundary.

Several of the project area meadows have perennial streams flowing through them (Table 3-2). In some cases, head cuts have developed over time along these streams and there is the risk of creating head cuts further upstream and contributing to continued meadow drying. Head cuts may also lead to channel bank instability and water quality issues downstream. The presence and severity of head cuts varies by meadow, with the most obvious head cut occurring at Freel Meadow.

The LTBMU has managed four grazing allotments in five of the six meadows since as early as 1965 (Appendix F); however, these meadows have a grazing history that predates these records. No livestock grazing has occurred in any of the project meadows since 2008. Grazing has been documented as a negative impact to water quality and season quantity (Belsky et al. 1999, Freilich et al. 2003), stream channel morphology (Belsky et al. 1999, Lucas et al. 2004), hydrology (Belsky et al. 1999, Lucas et al. 2004), instream and streambank vegetation (Belsky et al. 1999, Hough-Snee 2013), and aquatic wildlife (Freilich et al. 2003).

Two existing trail segments of the Pacific Crest Trail through Meiss Meadow have been identified as impeding meadow hydrology due to their close proximity to the stream channel and degraded surface condition caused by their location in low-lying wet meadow areas.

Droughts are a familiar stressor on vegetation in the LTBMU. Climate change is a newly recognized threat to the condition of Sierran meadows that may be a significant contributor to droughts and is likely to exacerbate the problem of meadow drying. Climate change will increase

stress on meadow systems within the LTBMU. All meadows selected for restoration under this project are experiencing some level of conifer encroachment, which is decreasing overall size of the meadows and competing with meadow vegetation for water. This situation is confounded by reoccurring droughts and a changing climate.

Baldwin Meadow

Tallac Creek flows through Baldwin Meadow. There is approximately 1.5 miles of perennial stream in the action area (Table 3-2). The stream as well as wetland/marsh (96 acres of SNYLF suitable habitat (Table 3-2)) is dominated by non-native and invasive aquatic species. Tallac creek and neighboring Taylor Creek have the largest bullfrog infestation in the Lake Tahoe Basin. Eurasian watermilfoil has been detected at the mouth of Tallac Creek and was treated in 2013.

Benwood Meadow

Benwood Meadows have limited perennial stream miles (0.3) and does not provide aquatic habitat needed to support fisheries. However, suitable habitat for other aquatic species, specifically amphibians, does occur in the action area (Table 3-2).

Freel Meadow

Freel Meadows contains no habitat for fisheries with limited stream habitat (0.1 mile). Habitat does exist for other aquatic species including 33 acres of suitable habitat for SNYLF (Table 3-2). However, water availability is seasonal while SNYLF requires permanent water sources that have sufficient depth to avoid freezing throughout the winter. It is unlikely that any aquatic habitat in Freel Meadows meets those depth requirements.

Hell Hole Meadow

Hellhole meadow is a naturally fishless area and provides occupied and suitable habitat for SNYLF, an endangered species under ESA. This is the only population of SNYLF on the Lake Tahoe basin. This meadow was recommended by the LTBMU to be included as critical habitat. The final designation for critical habitat is expected in 2015. The entire action area is considered suitable for SNYLF (Table 3-2).

Meiss Meadow

The Upper Truckee River within the action area supports a self-sustaining population of LCT, a federally threatened species under the ESA. A recovery effort was complete in 2009 in the proposed treatment area clearing all non-native trout. In 2008 implementation began on an additional 10 miles to expand the range of LCT in the Upper Truckee River.

Star Meadow

There are no perennial streams in the action area (Table 3-2), thus no existing fisheries habitat. Although 29 of the acres within the action area are considered suitable for SNYLF, it is unlikely that the existing habitat could support this species.

Aquatic Species

Lahontan Cutthroat Trout (*Oncorhynchus clarkia henshawi*)

Lahontan Cutthroat Trout (LCT) was listed as an endangered species in 1970 (Federal Register Vol. 35, p.13520). In 1975, under the Endangered Species Act of 1973 as amended (ESA), LCT was reclassified as threatened to facilitate management and to allow for regulated angling (Federal Register Vol. 40, p.29864). In 1995, the U.S. Fish and Wildlife Service (USFWS) released its recovery plan for LCT, encompassing six river basins within LCT historic range, including the Truckee River basin. Endangered Species Act Specific recovery targets related to down listing (i.e. number of self-sustainable sub-populations) have yet to be determined for the basin.

Historically, LCT occurred throughout the Truckee River drainage from the headwaters in California downstream to Pyramid Lake (Gerstung, 1988). By 1938 LCT had been extirpated from the Tahoe Basin. Historically, LCT utilized both lake and stream habitat. Like other native fish species, they prefer cold water habitat but could utilize a wide variety of habitats as long as oxygen levels were high and cover and food were plentiful. Stream dwelling LCT feed on drift, typically a combination of terrestrial and aquatic insects. In lake habitat small LCT feed on zooplankton or insects while larger LCT feed on other fish species, historically tui chub (Moyle, 2002).

To date, recovery efforts for LCT have been initiated by the USFWS in the headwaters of the Upper Truckee River and Fallen Leaf Lake. The headwaters of the Upper Truckee River are within the Meiss Meadow Action Area. LCT have also been stocked throughout the Lake Tahoe basin, including Lake Tahoe, for recreational fishing opportunities by State fish and game agencies. The LCT Tahoe Basin Recovery Implementation Team (TBRIT) has drafted a Short-Term Recovery Action Plan, which is awaiting review from the Management Oversight Group (MOG). The MOG are executives or agency representatives who are decision makers for LCT recovery within the range of the species. The short-term action plan is intended to identify goals, objectives, and actions for the recovery of LCT in the Tahoe basin in the next five to ten years. The short-term action plan is intended to be a living document that will be annually updated by the TBRIT.

Sierra Nevada yellow-legged frog (*Rana sierrae*) and Critical Habitat

Sierra Nevada (mountain) yellow-legged frog (SNYLF, *Rana sierrae*) is an Endangered Species with Proposed Critical Habitat under the ESA and a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). On April 25, 2013, the USFWS published a proposal in the Federal Register (Federal Register Vol.78, No. 80) proposing listing SNYLF as endangered and designating critical habitat. On April 29, 2014, the final rule was published in the **Federal Register** Vol. 79, No. 82 on Tuesday, April 29, 2014 (<http://www.gpo.gov/fdsys/pkg/FR-2014-04-29/pdf/2014-09488.pdf>) designating the species Endangered. The effective date of this final rule is June 30, 2014. There is not a final rule on the Proposed Critical Habitat to date. The criterion for the listing was based on the danger of extinction throughout the species entire range and on the immediacy, severity, and scope of the threats to its continued existence. These threats include habitat degradation and fragmentation, predation and disease, climate change, inadequate regulatory protections, and the interaction of these various stressors impacting small remnant populations. There has been a range wide reduction in abundance and geographic extent of surviving populations of frogs following decades of fish stocking, habitat fragmentation, and most recently a disease epidemic. This combination of population stressors makes persistence of the species precarious throughout the currently occupied range in the Sierra Nevada.

The following information is from the Proposed Rule that was published in the **Federal Register** Vol. 78, No. 80 on Thursday, April 25, 2013 (<http://www.gpo.gov/fdsys/pkg/FR-2013-04-25/pdf/2013-09600.pdf>). Citations can be found at this location. SNYLF currently exist in montane regions of the Sierra Nevada of California. Throughout their range, these species historically inhabited lakes, ponds, marshes, meadows, and streams at elevations ranging from 1,370 to 3,660 meters (m) (4,500 to 12,000 feet) (Federal Register Vol. 78, No. 80).

SNYLF are highly aquatic; they are generally not found more than 1 m (3.3 feet) from water (Federal Register Vol. 78, No. 80). Adults typically are found sitting on rocks along the shoreline, usually where there is little or no vegetation (Federal Register Vol. 78, No. 80). Although they may use a variety of shoreline habitats, both tadpoles and adults are less common at shorelines that drop abruptly to a depth of 60 cm (2 feet) than at open shorelines that gently slope up to shallow waters of only 5 to 8 cm (2 to 3 in) in depth (Federal Register Vol. 78, No. 80). SNYLF in the Sierra Nevada are most abundant in high-elevation lakes and slow-moving portions of streams (Federal Register Vol. 78, No. 80). Lake depth is an important attribute defining habitat suitability for SNYLF. As tadpoles must overwinter multiple years before metamorphosis, successful breeding sites are located in (or connected to) lakes and ponds that do not dry out in the summer, and also are deep enough that they do not completely freeze or become oxygen depleted (anoxic) in winter. Both adults and tadpole SNYLF overwinter for up to 9 months in the bottoms of lakes that are at least 1.7 m (5.6 feet) deep; however, overwinter survival may be greater in lakes that are at least 2.5 m (8.2 feet) deep (Federal Register Vol. 78, No. 80).

Adults tend to move between selected breeding, feeding, and overwintering habitats during the course of the year. Though typically found near water, overland movements by adults of over 66 m (217 feet) have been routinely recorded (Federal Register Vol. 78, No. 80); the farthest reported distance of a SNYLF from water is 400 m (1,300 feet) (Federal Register Vol. 78, No. 80).

Unlike other declining amphibian populations around the world, direct habitat modification does not seem to be a primary factor associated with the decline of SNYLF (Federal Register Vol. 78, No. 80). In most cases, SNYLF occur at high elevations in the Sierra Nevada, which have not had the types or extent of large-scale habitat conversion and physical disturbance that have occurred at lower elevations (Federal Register Vol. 78, No. 80), similar to meadow/aquatic habitat in the Action Area.

Other human activities, however, have played a role in the modification of habitat and the curtailment of the species range. The aggregation of these threats has degraded and fragmented habitats range wide to a significant extent. These threats include: recreational activities, fish introductions, dams and water diversions, livestock grazing, timber management, road construction and maintenance, and fire management activities. Such activities have degraded habitat in ways that have reduced their capacity to sustain viable populations and have fragmented and isolated populations from each other.

One habitat feature that is documented to have a significant detrimental impact to SNYLF populations is the presence of trout from current and historical stocking for the maintenance of a sport fishery. To further angling success and opportunity, trout stocking programs in the Sierra Nevada started in the late 19th century (Federal Register Vol. 78, No. 80). This anthropogenic activity has community-level effects and constitutes the primary detrimental impact to SNYLF habitat and species viability. Prior to extensive trout planting programs, almost all streams and

lakes in the Sierra Nevada at elevations above 1,800 m (6,000 feet) were fishless. Of the project meadows with perennial streams, only Hellhole is known to be fishless.

Introduced trout, whose significance is well-established because it has been repeatedly observed that nonnative fishes and frogs rarely coexist, and it is known that introduced trout can and do prey on all frog life stages (Federal Register Vol. 78, No. 80). It is estimated that 63 percent of lakes larger than 1 ha (2.5 ac) in the Sierra Nevada contain one or more nonnative trout species, and greater than 60 percent of streams contain nonnative trout (Federal Register Vol. 78, No. 80), in some areas comprising greater than 90 percent of total water body surface area (Federal Register Vol. 78, No. 80). The multiple-year tadpole stage of SNYLF requires submersion in the aquatic habitat year round until metamorphosis. Moreover, all life stages are highly aquatic, increasing the frog's susceptibility to predation by trout (where they co-occur) throughout its lifespan. Overwinter mortality due to predation is especially significant because, when water bodies ice over in winter, tadpoles are forced from shallow margins of lakes and ponds into deeper unfrozen water where they are more vulnerable to predation; fish encounters in such areas increase, while refuge is less available. The predation of SNYLF by fishes observed in the early 20th century by Grinnell and Storer and the documented declines of the 1970s (Federal Register Vol. 78, No. 80) were not the beginning of the SNYLF decline, but rather the end of a long decline that started soon after fish introductions to the Sierra Nevada began in the mid-1800s (Federal Register Vol. 78, No. 80). In 2004, Vredenburg (Federal Register Vol. 78, No. 80) concluded that introduced trout are effective predators on SNYLF tadpoles and suggested that the introduction of trout is the most likely reason for the decline of the SNYLF complex. This threat is a significant, prevalent risk to SNYLF rangewide, and it will persist into the future.

Activities that alter the terrestrial environment (such as road construction and timber management) may impact amphibian populations in the Sierra Nevada (Federal Register Vol. 78, No. 80). These impacts are understandably in proportion to the magnitude of the alteration to the environment, and are more pronounced in areas with less stringent mitigation measures. Road construction and timber harvest were likely of greater significance historically, and may have acted to reduce the species' range prior to the more recent detailed studies and systematic monitoring that have quantified and documented these losses. Timber management activities remove vegetation and cause ground disturbance and compaction, making the ground more susceptible to erosion (Federal Register Vol. 78, No. 80). This erosion increases siltation downstream that could potentially damage SNYLF breeding habitat. The majority of erosion caused by timber management is from logging roads (Federal Register Vol. 78, No. 80). Additionally, roads, including those associated with timber management, can contribute to habitat fragmentation and limit amphibian movement, thus having a negative effect on amphibian species richness (Federal Register Vol. 78, No. 80). This effect could fragment SNYLF habitat if the road bisected habitat consisting of water bodies in close proximity. However, neither of these factors (timber management and roads) has been implicated as an important contributor to the decline of this species (Federal Register Vol. 78, No. 80). It is likely a minor prevalent threat to SNYLF factored across the range of the species.

However, in some areas within the current range of the SNYLF, long-term fire suppression has changed the forest structure and created conditions that increase fire severity and intensity (Federal Register Vol. 78, No. 80). Excessive erosion and siltation of habitats following wildfire is a concern in shallow, lower elevation areas below forested stands. However, prescribed fire has been used by land managers to achieve various silvicultural objectives, including fuel load reduction. In some systems, fire is thought to be important in maintaining open aquatic and riparian habitats for amphibians (Federal Register Vol. 78, No. 80), although severe and intense wildfires may reduce amphibian survival, as the moist and permeable skin of amphibians

increases their susceptibility to heat and desiccation (Federal Register Vol. 78, No. 80). Amphibians may avoid direct mortality from fire by retreating to wet habitats or sheltering in subterranean burrows. It is not known what impacts fire and fire management activities have had on historical populations of SNYLF. Neither the direct nor indirect effects of prescribed fire or wildfire on the SNYLF have been studied. However, where wildfire has occurred in southern California, the character of the habitat has been significantly altered, leading to erosive scouring and flooding after surface vegetation is denuded (Federal Register Vol. 78, No. 80). When a large wildfire does occur in occupied habitat, SNYLF are susceptible to direct mortality (leading to significantly reduced population sizes) and indirect effects (habitat alteration and reduced breeding habitat). Based on the best available scientific and commercial information, the threats of modification and curtailment of the species' habitat and range from large scale wildfire is a significant, ongoing threat to the SNYLF.

Chytridiomycosis is an infectious disease of amphibians caused by the fungus *Batrachochytrium dendrobatidis* ("Bd"; Longcore et al. 1999). The extraordinary virulence of *Bd* has caused the decline or extinction of hundreds of amphibian species around the world during the last several decades (Skerratt et al. 2007) and hundreds more are considered at risk as *Bd* spreads into new areas. SNYLF is particularly susceptible to *Bd*, and the spread of this pathogen across California during the past 30 years has caused the loss of hundreds of frog populations from remaining fishless habitats in the Sierra Nevada (Rachowicz et al. 2006, Vredenburg et al. 2010). The population of SNYLF is *Bd* positive.

This project contains up to 520 acres of suitable SNYLF habitat ((Table 3-2) as defined by USFWS and Forest Service Region 5: all areas within 25 meters (82 feet) of perennial or intermittent streams, lakes, meadows, and ponds)). Due to the timing of the NEPA decision, however, this project was not included in the regional programmatic batching for Section 7 ESA consultation on SNYLF, which was a programmatic effort that includes projects containing suitable habitat across all forests in Region 5. Although this project was not included in the programmatic consultation, once the consultation process with FWS is complete, some information will be incorporated into this project NEPA, BA/BE, and decision documents.

Yosemite Toad (*Bufo canorus*)

The Yosemite Toad is currently a Threatened Species with Proposed Critical Habitat under the ESA. On April 25, 2013, the US Fish and Wildlife Service (FWS) published in the Federal Register (Federal Register Vol.78, No. 80) proposing listing Yosemite toad as Threatened and designating critical habitat. Yosemite Toad is also listed by the State of California as a Species of Special Concern. To date, range-wide conservation activities (including the development of a conservation strategy) for Yosemite toad have been accomplished in a multi-agency format involving the USFWS, National Park Service, USFS, CDFW and academic institutions such as the University of California, Berkeley and Sierra Nevada Aquatic Research Laboratory. On April 29, 2014, the USFWS published the final ruling to list the Yosemite toad as threatened (**Federal Register** / Vol. 79, No. 82 / Tuesday, April 29, 2014). Refer to the federal register for more information: <http://www.gpo.gov/fdsys/pkg/FR-2014-04-29/pdf/2014-09488.pdf>.)

Yosemite toads are endemic to the Sierra Nevada Mountains or Province from Ebetts Pass, Alpine County to the Spanish Springs Mountain area, Fresno County (Karlstrom, 1973; Stebbins 1966) at elevations ranging from 1950 to 3444 m (6398 to 11299 feet). Jennings and Hayes (1994a) estimate that populations have disappeared from 50 percent of historical habitat. Of historical sites, declines have been concentrated in lower elevation locations with greater persistence in higher elevation locations (Davidson et al, 2002). Their current range borders the boundary of the Tahoe Basin but, to date, no detections have been recorded.

Because the range of this species is currently outside the boundary of the Lake Tahoe Basin, it will not be discussed in more detail as the proposed project activities will have no effect on the species or its habitat.

Lahontan Lake Tui Chub (*Gila bicolor pectinifer*)

Lahontan Lake tui chub is a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). They occur in open water habitats, such as lakes, lagoons or river mouths and feed primarily on zooplankton. Tui chub populations have presumably declined as a result of introductions of non-native species, specifically kokanee salmon (*Oncorhynchus nerka*) and opossum shrimp (*Mysis relicta*), which, through predation and competition, have significantly reduced native zooplankton (Moyle, 2002). Compounding these impacts are the illegal introductions of invasive warm-water fishes, specifically largemouth bass but potentially blue gill, crappie and brown bullhead catfish, which prey on juvenile chubs at their inshore rearing habitats (Kamerath et al. 2008).

Great Basin rams-horn (*Helisoma newberryi*)

Great Basin rams-horn is a Region 5 Forest Service Sensitive Species (USDA Forest Service 1998). This aquatic pulmonate snail has hemoglobin in its blood and a secondary gill or pseudobranch, allowing it to occupy poorly oxygenated, but cold waters such as cold spring upwellings. It can be almost invisible to the casual observer even when abundant because it may burrow into muddy substrates. This species may be found in larger lakes and slow rivers, including larger spring sources and spring-fed creeks (Taylor 1981). In Eagle Lake, Lassen County, this species commonly occurs on top of sandy substrates at depths greater than 10 feet (3 m) (Brim Box et al. 2005). Historically the species occurred in Lake Tahoe and the slow flowing outflow into the Lower Truckee River. The population status of Great Basin rams-horn is currently unknown as no surveys have been conducted.

Environmental Consequences

Analysis of direct, indirect, and cumulative effects of the two alternatives on FWS and FSS aquatic species and habitat is presented for Alternative 1 (No Action) and Alternative 2 (Proposed Action) as described in detail in Chapter 2 of this EA.

Direct / Indirect Effects Analysis

Proposed project activities, described below, could disturb individuals and/or populations of aquatic species during implementation. These activities are discussed in detail in Chapter 2. Potential direct and indirect effects on FWS and FSS aquatic species and habitat were determined by evaluating the type and amount of existing habitat for each species (Table 3-2), type and amount of habitat alteration/removal/creation for each species, and type and magnitude of disturbance for each species.

Tree Removal

Tree removal activities by hand crews are proposed to reduce the density of conifers in the project area meadows and associated buffer areas. Conifers may be removed completely within the meadows. Meadow buffers will be thinned to reduce future conifer seed sources into the meadow and to act as a fire-control measure to allow for optimal control of prescribed fire within the meadows. Removing trees along stream channels could result in instability and ground disturbance along channel banks. Tree removal activities by hand crews are by design a low impact activity. This type of treatment technique minimizes ground disturbance by limiting soil compaction and reducing the need to drag material over the ground.

Prescribed Burning

Prescribed fire in the form of broadcast burning and pile burning is proposed with this project. No broadcast burning will occur in Hellhole Meadow. Prescribed fire will be used primarily to remove small conifers and to enhance native riparian plant vigor and diversity. Piles in close proximity to stream channels could contribute to surface water quality impacts from the transport of ash and debris to streams. For this reason, piles will be placed at least 25 feet from the edge of stream channels to prevent water quality impacts resulting from burned material or ash being transported to channels. Existing roads and trails would be utilized as fire lines to minimize new ground disturbance, although additional fire lines may need to be constructed with hand tools within limited portions of project SEZs. Any needed fire lines within meadows would primarily be wet-line construction (using water to saturate the ground rather than physically constructing a line of bare soil); hard fire line would be minimized. All constructed fire lines would be rehabilitated after implementation following Region 5 Best Management Practices (BMPs) (Appendix A).

Head cut Repair

The head cuts being repaired with this project are relatively small in size, such that they can be repaired by hand crews using on-site rock, log material, willows, or other vegetative materials. Larger head cuts (more than approximately 2 feet high) will not be repaired with this project. Some or all of these head cuts would be repaired with this project by arresting the head cuts in their existing location, and preventing them from getting deeper or propagating further upstream. Head cut repair in each of these meadows would be focused on perennial and intermittent channels, and the spring in Star Meadow. For this reason, it is likely that the channels will be flowing during in-channel activities. In order to avoid diverting flows, any head cuts identified on perennial channels or flowing intermittent channels will not involve excavation or earth movement; actions will focus on strategic placement of onsite material. In order to avoid adverse water quality impacts, loose dirt and other debris will be cleared from rocks and logs before placing them into channels at head cuts.

Re-establishment of Meiss Corral

Once the corral is re-established, it is likely that pack animals visiting the area would use it for daytime or overnight stays. The corral occupies approximately 0.1 acre of Meiss Meadow and is 35 feet from the Upper Truckee River. Wherever there is concentrated use by pack animals, there is potential for accumulation of urine and animal feces. During rain and snowmelt conditions, this material could be carried with runoff from the corral to surface waters in the vicinity, contributing to water quality impacts.

Re-routing trails

Two segments of the Pacific Crest Trail through Meiss Meadow are adversely affecting meadow hydrology and need repair. The trail segments being re-routed total approximately 1.1 mile in length. The new trail segment will be located on high capability land further away from the channel adjacent to the meadow's edge.

Cumulative Effects Analysis

The Action Area, as described above, is spatially defined as the 892 acre Action Area comprising six meadows located on the south shore of Lake Tahoe (Figure 1-3). The Action Area in each meadow includes a treatment buffer and encompasses all aquatic habitat potentially affected by proposed project activities. Only Meiss Meadow includes additional aquatic habitat outside the buffered treatment area. Because Meiss meadow contains LCT occupied stream habitat and LCT

occur downstream from the project area, additional stream miles will be analyzed. The Action Area is temporally defined to extend 15 years before and after the present. Appendix D of this EA describes the projects and activities considered for cumulative effects.

Alternative 1 – No Action

Aquatic Habitat

The no action alternative would leave meadows and associated stream habitat on the current trajectory. Head cuts along channels would remain or worsen over time with no actions to repair them. Bank erosion, resulting from head cuts, would degrade water quality and reduce aquatic habitat, specifically spawning habitat. As the meadows continue to dry and conifers continue moving into the meadows, the vegetation community could shift to drier site species, or possibly transform to a forest environment. Excessive encroachment by conifers could leave habitat more susceptible to unintended wildfire.

Aquatic Species

Lahontan Cutthroat Trout (*Oncorhynchus clarkia henshawi*)

The no-action alternative could contribute to a decline in the quality and quantity of occupied and potential habitat for LCT, specifically by leaving meadow and stream habitat susceptible to unplanned fire and continued erosion from un-treated head cuts. Existing head cuts would continue contributing sediment into stream channels reducing the quality and quantity of available spawning habitat as well as causing stream incision. If streams continue to incise and become disconnected from the floodplain, habitat could be impacted, specifically in higher flows, as the entrenched streams are unable to deposit sediment on the floodplain.

Sierra Nevada Yellow-legged Frog (*Rana sierrae*)

The no-action alternative could contribute to a decline in the quality and quantity of occupied and potential habitat for SNYLF, specifically by allowing meadow and stream habitat to stay in their degraded state leaving them susceptible to continued drying due to conifer encroachment and reduction in ground water, unplanned fire and continued erosion from un-treated head cuts. SNYLF are highly aquatic but need habitats with sufficient sunlight to warm the water where they congregate and to allow sub-adults and adults to bask in the sun. If conifer encroachment continues in the current trajectory, aquatic habitat with sufficient sun exposure could become limited, reducing the quantity and quality of habitat for SNYLF.

Because long-term fire suppression has changed the forest structure and created conditions that increase fire severity and intensity (Federal Register Vol. 78, No. 80), including meadows within the Restoration of Fire Adapted Ecosystems project, the no action alternative would allow the current trajectory and potential threat to continue/increase, potentially impacting habitat and species. Where wildfire has occurred in southern California, the character of the habitat has been significantly altered, leading to erosive scouring and flooding after surface vegetation is denuded (Federal Register Vol. 78, No. 80). As stated above, when a large wildfire does occur in occupied habitat, SNYLF are susceptible to direct mortality (leading to significantly reduced population sizes) and indirect effects (habitat alteration and reduced breeding habitat). Based on the best available scientific and commercial information, the threats of modification and curtailment of the species' habitat and range from large scale wildfire is a significant, ongoing threat to the SNYLF. Although this project will not significantly reduce the chances of a large scale wildfire, if a fire did occur near the Action Area, the reduced fuel load buffering the meadows could reduce the impacts of wildfire within the meadow and associated aquatic habitat.

Existing head cuts would continue contributing sediment into stream channels reducing the quality and quantity of available spawning habitat as well as causing stream incision. If stream continue to incise and become disconnected from the floodplain, habitat could be impacted, specifically in higher flows, as the entrenched stream is unable to deposit sediment on the floodplain and cause additional drying of the meadow.

Lahontan Lake Tui Chub (*Gila bicolor pectinifer*)

Under Alternative 1, limited suitable habitat exists for this species. It has not been detected in the project area or analysis area. Therefore, there are no effects to this species or habitat under Alternative 1.

Great Basin Great Basin rams-horn (*Helisoma newberryi*)

No surveys have been conducted for the Great basin rams-horn; however, habitat does occur in the project area, specifically in spring habitat. This project could have indirect impacts on habitat as continued incision of streams/ditches and head cuts could drain spring habitat, reducing both quality and quantity of available habitat.

Alternative 2 – Proposed Action

Aquatic Habitat

Although this project involves only hand treatment of conifers, removing trees along stream channels could result in instability and ground disturbance along channel banks. The RPMs for this project include restrictions to avoid this impact, such as leaving downed trees and large woody debris that exist in perennial and intermittent channels in place, using directional falling to keep removed trees out of perennial and intermittent channels, and restricting tree removal activities within 5 feet of perennial and intermittent channels unless approved by a watershed specialist. Implementation of these RPMs is expected to avoid impacts to stream channels from tree removal activities.

Perennially wet areas such as fens can be prone to impacts from even this low impact activity. Fens are known to exist in Baldwin (3.9 ac); Freel (3.0 ac); Hell Hole (19.3 ac); and Meiss (8.8 ac), and may be found in other portions of the Action Area. There are no fens documented in Benwood or Star Meadows. For this reason, fens will be identified in the field prior to tree removal activities and ground disturbing activities such as tree stump removal, material removal (i.e. soil, rock, gravel, wood), soil excavation and staging equipment and materials will be excluded from fens. In addition, foot traffic will be limited in these areas and felled trees will not be dragged through fens. With implementation of these RPMs in fens, and because hand tree removal activities are very low impact treatments in general, impacts to sensitive soil areas and aquatic habitat from tree removal activities are not expected to result from this project.

In addition, fire line construction will be excluded from sensitive soil areas, such as fens. In other locations, fire lines will be in place for only a short period of time prior to rehabilitation after the broadcast burn, some short term surface drainage effects could result from fire line construction. However, since construction would be limited in meadow areas and excluded from fens, and full rehabilitation is planned for fire lines used for this project, long term or permanent impacts to aquatic habitat is not expected to result from fire line construction for this project.

Implementation of the project RPMs, including limitations on pile density and location related to pile burning will avoid impacts to aquatic habitat. Piles will be placed at least 25 feet from the edge of stream channels to prevent water quality impacts resulting from burned material or ash being transported to channels. Additionally, pile density will be limited within SEZs to prevent

scorched ground surface conditions over a large portion of the landscape near stream channels. The footprint of piles burned in a given year will also be limited within SEZs, and pile construction will be limited in fens. Piles will be concentrated on meadow boundaries when feasible to prevent large concentrations of piles on the meadow surface.

Broadcast burning prescriptions would be designed to ensure that fire intensity and duration do not result in severely burned soils, which could lead to increased sedimentation into stream courses. Flame heights would not exceed 2 feet within 25 feet of stream channels or on wetlands unless higher intensities are required to achieve specific objectives. No ignitions will take place within 25 feet of perennial and intermittent channels; however fire will be allowed to back into these areas. Fire ignition is prohibited within fens. These specifications will reduce/eliminate the likelihood of impacts to water quality and associated aquatic habitat.

Because head cut repair will occur during low flow conditions and limited bed and bank disturbance is proposed, impacts to water quality would be minor, and limited in duration. These short-term water quality impacts are not expected to result in long-term effects to aquatic habitat; however, long-term benefits to quality and quantity of aquatic habitat are expected by addressing head cuts. Stabilization of head cuts in the specific meadows will reduce bank and bed erosion and improve water quality/aquatic habitat downstream. Any short term water quality impacts associated with placement of rock and log/slash materials in the channels at head cuts will be very minor with implementation of the RPMs.

Due to the small footprint of the corral, limited use by only visiting pack animals, and the distance of the corral from the stream, it is not anticipated that re-establishment of the Meiss Corral will result in impacts to hydrology or aquatic habitat. Livestock used for the transport of equipment needed for implementation activities will be prohibited from fens. No overnight trips utilizing pack animals is expected but given the limited duration and extent of livestock use in project area meadows, impacts to aquatic habitat is not expected.

Aquatic Species

Lahontan Cutthroat Trout (*Oncorhynchus clarkia henshawi*)

The proposed action could have short term impacts to occupied and potential habitat for LCT. Hand thin operations adjacent to stream channels could result in instability and ground disturbance along channel banks. RPMs (Chapter 2) that include, but not limited to, leaving existing downed trees and large woody debris in both perennial and intermittent channels and using directional falling will reduce the short-term impacts.

Piles in close proximity to stream channels could contribute to surface water quality impacts from the transport of ash and debris into streams. Because no piles will be within 25 feet of a stream channel, the effects of this action should be minimized or eliminated. Additionally, broadcast burning prescriptions would be designed to ensure that fire intensity and duration do not result in severely burned soils and that flame height does not exceed 2 feet within 25 feet of the stream channel. No ignitions will take place within 25 feet of perennial or intermittent streams. Although burning activities could contribute minimal short-term effects to water quality and associated habitat, the effects would be negligible. The benefits of restoring the natural fire regime and slightly reducing the potential for a wildfire would have long-term beneficial effects to the quality of habitat for LCT, specifically in Meiss Meadow, which is occupied.

Similarly, if small head cuts were identified and repaired in Meiss Meadow, as well as other meadows where potential habitat exists, habitat for LCT would improve as sedimentation decreased.

Sierra Nevada Yellow-legged Frog (*Rana sierrae*)

The proposed action could have short term impacts to occupied and suitable habitat for SNYLF. Vegetation management including conifer removal and prescribed fire that alter the terrestrial environment may impact SNYLF populations. These impacts are understandably in proportion to the magnitude of the alteration to the environment, and are more pronounced in areas with less stringent mitigation measures. Vegetation management activities can increase erosive characteristics of the ground, increasing siltation downstream, which could impact breeding habitat for SNYLF. Because only hand thinning operations are proposed and RPMs will reduce/eliminate soil disturbing activities near waterbodies, the potential effect to populations and habitat are low.

Perennially wet areas such as fens can be prone to impacts from even this low impact activity. Fens are known to exist in Baldwin, Freel Meadow, Hell Hole Meadow, and Meiss, and may be found in other portions of the project treatment area. For this reason, fens will be identified in the field prior to tree removal activities and ground disturbing activities such as tree stump removal, material removal (i.e. soil, rock, gravel, wood), soil excavation and staging equipment and materials will be excluded from fens. In addition, foot traffic will be limited in these areas and felled trees will not be dragged through fens.

Piles in close proximity to stream channels could contribute to surface water quality impacts from the transport of ash and debris into streams. Because no piles will be within 25 feet of a stream channel, the effects of this action should be minimized or eliminated. Additionally, broadcast burning prescriptions would be designed to ensure that fire intensity and duration do not result in severely burned soils and that flame height does not exceed 2 feet within 25 feet of the stream channel. No broadcast burning will occur in Hell Hole. No ignitions will take place within 25 feet of perennial or intermittent streams. Although burning activities could contribute minimal short-term effects to water quality and associated habitat, the effects would be negligible. The benefits of restoring the natural fire regime and slightly reducing the potential for a wildfire would have long-term beneficial effects to the quality and quantity of habitat for SNYLF, specifically in Hellhole Meadow, which is occupied.

Long-term fire suppression has changed the forest structure and created conditions that increase fire severity. This change in structure threatens SNYLF populations and habitat by reducing the quality and quantity of habitat as meadows shift to upland habitat. Additionally the change in fire intensity threatens SNYLF populations and habitat due to the increased in erosion, increase of water temperatures, loss of habitat, and direct mortality that can occur due to wildfire. The prescribed fire and vegetation treatment proposed under Alternative 2 will maintain and enhance open aquatic and riparian habitat for SNYLF.

Lahontan Lake Tui Chub (*Gila bicolor pectinifer*)

Under Alternative 2, no suitable habitat exists for this species. It has not been detected in the project area or analysis area. Therefore, there are no effects to this species or habitat under Alternative 2.

Great Basin Great Basin rams-horn (*Helisoma newberryi*)

No surveys have been conducted for the Great basin rams-horn; however, habitat does occur in the project area, specifically in spring habitat. This project could have short term effects on

habitat during implementation but long term beneficial effects as riparian habitat increases through conifer removal and head cuts are restored.

Cumulative Effects Analysis

Of the six meadows/Action Areas analyzed, only Baldwin and Meiss have potential cumulative effects when considering past, present, and future projects because five of the six meadows are in Inventoried Roadless Areas (IRAs) and there are limited past, present, or future projects.

Within the meadows in IRAs, only Meiss Meadows Action Area has past, present and future activities, all of which are for LCT recovery. This project when considered with any past, present or future LCT recovery project will not add cumulative impacts to the species or habitat.

Baldwin Meadow has a suite of past, present, and foreseeably future projects (see Appendix D); however, no TES occur within the Action Area and therefore no cumulative effects to species are expected.

Analytical Conclusions

Alternative 1 (no action) would avoid effects to all focal species and their habitat. However, it would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity. All of which are the long-term effect of human disruption of the natural condition in the Lake Tahoe area. Alternative 1 would forego the opportunity to correct some of these long-term effects and leave meadows on their current trajectory.

Alternative 2 (proposed action) could cause short-term disturbance to species present in the Action Areas as well as habitat. However, long term effects achieved by removing conifers, reestablishing a natural fire regime and addressing small head cuts would increase the quality and quantity of habitat for focal aquatic species. Overall, Alternative 2 would have a greater benefit to aquatic species and to aquatic habitats in the LTBMU.

Botanical Resources

Introduction

This section analyzes potential effects to any federally endangered, threatened, proposed or candidate botanical species, or Forest Service Region 5 Sensitive botanical species (referred to collectively as TEPCS botanical species) as well as other botanical resources, such as TRPA Sensitive Plants, LTBMU Watch List botanical species and uncommon plant communities. Effects to TEPCS botanical species are discussed in detail in the project's Biological Evaluation of Botanical Species and effects to other botanical resources are discussed in detail in the project's Other Botanical Resource Assessment report, all available in the project record

For watch list plant species that are of conservation concern the list is included in the project's "Other Botanical Resource Assessment". These species have not been designated as Sensitive by the Regional Forester, but According to the Regional Forester Watch List plant species should be considered during project planning with corresponding documentation maintained in the planning file (USDA Forest Service 2006).

For uncommon plant communities, the LTBMU supports several that warrant consideration in the project planning process. The LTBMU Land and Resource Management Plan directs the Forest Service to manage uncommon plant communities to preserve their natural characteristics, specifically Osgood Swamp, Grass Lake, and Freel Cushion Plant Community (USDA Forest Service 1988). The SNFPA directs the Forest Service to address Special Aquatic Features (including fens) during project analyses and to maintain, restore, and/or enhance these features on National Forest System (NFS) lands (USDA Forest Service 2004). Eleven fens have been delineated within the project area. There are no other uncommon plant communities within the project area.

Methodology

For botanical resources, the area analyzed encompasses approximately 17,025 acres and consists of all proposed activities (892 ac), access roads to the project area, and an area approximately one mile around all proposed activities.

The following indicators were used to analyze the impacts to botanical resources:

- Number (acres) of TEPCS occurrences affected by proposed activities;
- Acres of whitebark pine affected by proposed activities; and
- Acres of fens affected by proposed activities.

The analysis of effects on TEPCS botanical species and their habitats, as well as watch list species, and uncommon plant communities was a three-step process, involving identification of plant species, habitats, and communities that may be affected by project activities, checking for adequate field reconnaissance surveys, and analyzing the affects to species by the project activities. This was done by using botanical information and project activity data to analyze proximity to the proposed activities, identify direct and indirect effects, and develop resource protection measures.

TEPCS Plant Species and habitats

Those TEPCS species present within or that have suitable habitat in the project area are anticipated to have the highest potential to be impacted by the proposed activities. While all TEPCS species with occurrences within the analysis area were considered, the proposed activities

are not expected to have direct, indirect, or cumulative effects that would extend beyond the project area. As such, species outside the project area were considered, but dismissed from further effects analysis. Table 3-3 lists all Federally listed TEPC, and Forest Service Region 5 Sensitive botanical species that are known or have suitable habitat on the LTBMU. There are no federally threatened, endangered, or proposed botanical species known to occur or with known suitable habitat within the LTBMU. The 16 species analyzed in detail in this document—those that fall within or have suitable habitat within the project area—are indicated in the table.

Table 3-3. List of all threatened, endangered, proposed and candidate Species and Forest Service Sensitive botanical species known to occur or have suitable habitat on LTBMU. Species analyzed further in this document for this project are indicated with check marks in the “known in project area” and or “suitable habitat in project” columns.

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project area	Suitable habitat in project	Rationale for why habitat is unsuitable
<i>Boechea rigidissima</i> (<i>Arabis rigidissima</i> var. <i>demota</i>)	Galena Creek rock cress	FSS	Open, rocky areas along forest edges of conifer and/or aspen stands; usually found on north aspects; confirmed only in Placer, Nevada, and Washoe counties; 7,500 ft. & above.	X			Project area is outside of known species range
<i>Boechea tiehmii</i>	Tiehm’s rock cress	FSS	Open rocky soils in the Mt. Rose Wilderness; 10,000 ft. & above.	Suitable habitat only			Project area is outside known species range & too low
<i>Boechea tularensis</i>	Tulare rockcress	FSS	Shaded, mostly east-facing subalpine rocky areas, including rocky slopes, rock-lined streams and seeps, rocky outcrops, saddles, and canyons; 6,000-11,000 ft.	Known only from herbarium or text records		X	
<i>Botrychium</i> spp.			<i>Botrychium</i> species are found in similar habitat; wet or moist soils such as marshes, meadows, and along the edges of lakes and streams; generally occur with mosses, sedges, rushes, and other riparian vegetation; 2,000-10,000 ft.				
<i>Botrychium ascendens</i>	upswept moonwort	FSS	See <i>Botrychium</i> spp.	X		X	
<i>Botrychium crenulatum</i>	scalloped moonwort	FSS		X		X	
<i>Botrychium lineare</i>	slender moonwort	FSS		Suitable habitat only		X	
<i>Botrychium lunaria</i>	common moonwort	FSS		Suitable habitat only		X	
<i>Botrychium minganense</i>	Mingan moonwort	FSS		X		X	
<i>Botrychium montanum</i>	western goblin	FSS		X		X	
<i>Bruchia bolanderi</i>	Bolander’s candle moss	FSS		Mainly in montane meadows and stream banks, but also on bare, slightly eroding soil where competition is minimal.	X	X	X

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project area	Suitable habitat in project	Rationale for why habitat is unsuitable
<i>Dendrocollybia racemosa</i> ¹	branched collybia	FSS	On old decayed or blackened mushrooms or occasionally in coniferous duff, usually within old growth stands.	Known only from herbarium or text records		X	
<i>Draba asterophora</i> var. <i>asterophora</i>	Tahoe draba	FSS; TRPA	Rock crevices and open granite talus slopes on north-east slopes; 8,000-10,200 ft.	X		X	
<i>Draba asterophora</i> var. <i>macrocarpa</i>	Cup Lake draba	FSS; TRPA	Steep, gravelly or rocky slopes; 8,400-9,300 ft.	X			Project is outside known range of variety
<i>Draba cruciata</i>	Mineral King draba	FSS	Subalpine gravelly or rocky slopes, ridges, crevices, cliff ledges, sink holes, boulder and small drainage edges; 7,800-13,000 ft.	Known only from herbarium or text records		X	
<i>Erigeron miser</i>	starved daisy	FSS	Steep, granitic rock outcrops; 6,000 ft. & above	Suitable habitat only			Project area is outside species range & does not include rock outcrops
<i>Eriogonum luteolum</i> var. <i>saltuarium</i>	goldencarpet buckwheat	FSS	Sandy granitic flats and slopes, sagebrush communities, montane conifer woodlands; 5,600-7,400 ft.	Suitable habitat only			Project area is outside spp. range & does not include sagebrush
<i>Eriogonum umbellatum</i> var. <i>torreyanum</i>	Donner Pass buckwheat	FSS	Dry gravelly or stony sites; often on harsh exposures (e.g. ridge tops, steep slopes)	Suitable habitat only			Project area is outside known spp. range
<i>Helodium blandowii</i>	Blandow's bog-moss	FSS	Bogs, fens, wet meadows, and along streams under willows.	X		X	
<i>Hulsea brevifolia</i>	short-leaved hulsea	FSS	Red fir forest, but also in mixed conifer forests; found on gravelly soils; 4,900-8,900 ft.	Suitable habitat only		X	
<i>Ivesia sericoleuca</i>	Plumas ivesia	FSS	Vernally wet portions of meadows and alkali flats, vernal pools within sagebrush scrub or lower montane coniferous forest; often on volcanic soils; 4,300-7,200 ft.	Suitable habitat only			Project is outside known spp. range & does not include sagebrush
<i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i>	Kellogg's lewisia	FSS	Ridge tops or flat open spaces with widely spaced trees and sandy granitic to erosive volcanic soil; 5,000-7,000 ft.	Suitable habitat only			Project area does not include ridgetops or suitable soil textures

Scientific Name	Common Name	Legal Status	Suitable habitat characteristics	Known on LTBMU	Known in project area	Suitable habitat in project	Rationale for why habitat is unsuitable
<i>Lewisia kelloggii</i> ssp. <i>kelloggii</i>	Kellogg's lewisia	FSS	See <i>Lewisia kelloggii</i> ssp. <i>hutchisonii</i>	Suitable habitat only			Project area does not include ridgetops or suitable soil textures
<i>Lewisia longipetala</i>	long-petaled lewisia	FSS; TRPA	North-facing slopes and ridge tops where snow banks persist throughout the summer; often found near snow bank margins in wet soils; 8,000-12,500 ft.	X			Project does not include ridgetops and is mostly below elevation range
<i>Meesia uliginosa</i>	broad-nerved hump-moss	FSS	Bogs and fens, but also very wet meadows.	X		X	
<i>Orthotrichum praemorsum</i>	orthotrichum moss	FSS	Shaded, moist habitats of east side of Sierra Nevada rock outcrops; up to 8,200 ft.	Known only from herbarium or text records			Project area is outside known spp. range
<i>Peltigera gowardii</i>	Goward's water fan	FSS	Cold unpolluted streams in mixed conifer forests.	X		X	
<i>Pinus albicaulis</i>	whitebark pine	C; FSS	Subalpine and at timberline on rocky, well-drained granitic or volcanic soils.	X	X	X	
<i>Rorippa subumbellata</i>	Tahoe yellow cress	C; FSS; TRPA	Endemic to the shore zone of Lake Tahoe, typically in back beach areas between 6,223 and 6,230 ft.	X			Project area is not on shoreline of Lake Tahoe
					2	16	

Botanical species includes vascular and non-vascular plants, lichen, and fungi.

Legal status: C—Candidate for federal listing under the Endangered Species Act; FSS—Forest Service Sensitive (Regional Forester's Sensitive Species List, Region 5); TRPA—Tahoe Regional Planning Commission Sensitive Species (TRPA Code of Ordinances 2012)

¹For branched collybia, surveys are only effective when fruiting bodies are visible. This species typically fruits in late fall -early winter. The extent to which aboveground fruiting bodies are correlated with the abundance of underground structures is unknown. When a survey does not find the fruiting body, the species could still be present at the site. Because of this detection difficulty, it is important to manage habitat in a state that is suitable for fungi.

While the botanical species analyzed vary widely in their ecological requirements and life history characteristics, they occur in similar broad habitat types where the effects of proposed management are comparable; habitat requirements for each species are summarized in Table 3-3. As such, to discuss the potential indirect effects to suitable habitat, species are aggregated by habitat type and effects to each habitat described. The 16 species with suitable habitat in the project area can be aggregated into three broad categories based upon habitat type. Table 3-4 provides a summary of the acreage of each habitat type within the project area:

- Species associated with meadow habitat: Bolander's candle-moss, upswept moonwort, scalloped moonwort, slender moonwort, common moonwort, Mingan moonwort, western goblin, and Goward's water fan.
- Species restricted to fens: Blandow's bog-moss and broad-nerved hump-moss.
- Species associated with upland habitat: Tulare rockcress, branched collybia, Tahoe draba, Mineral King draba, short-leaved hulsea, and whitebark pine.

Table 3-4. Summary of habitat types in project area

Meadow Name	Meadow habitat (acres) ¹	Upland habitat (acres) ²	Total	Fen Habitat (acres) ³
Baldwin	121	0	121	3.9
Benwood	27	43	70	0
Freel	21	29	50	3.0
Hell Hole	66	0	66	19.3
Meiss	285	244	529	8.8
Star	13	43	56	0
TOTAL	533	172	892	35.0

¹Meadow treatment area as outlined in Chapter 2

²Maximum treatment buffer area for each meadow as outlined in Chapter 2

³Fens are not classified as a separate treatment type in the project. Due to their ecological importance, fens are included as a separate habitat type for analysis; generally they are a subset of meadow habitat. Acreage is calculated from field measurements of known fens as recorded in LTBMU's corporate GIS database.

Overview of the Affected Environment

Only two of the TEPCS botanical species occur within the project area. Those two species will be described in detail. All other species have not been found within the project area and are only described in general terms of effects on habitat types where they would occur in the project area.

Bolander's candle-moss (*Bruchia bolanderi*)

This ephemeral bryophyte has a broad range, including Oregon, California, Nevada and Utah (California Native Plant Society 2012). There are seven known occurrences on LTBMU. Species monitoring on LTBMU includes only presence/absence data at five occurrences, making it difficult to determine a trend for Bolander's candle moss on LTBMU (McKnight and Engelhardt 2012). Threats include trampling of stream banks and any other activity that would increase erosion or alter hydrology (Harpel 2009).

There is one known location of Bolander's candle-moss within the project area (BRBO4)—at Hell Hole meadow. When it was last surveyed in 2014, the occurrence consisted of three clusters, spanning approximately 250, 200, and 60 feet, respectively (0.30 ac) with a few scattered smaller (< 1ft) clusters. Plants occur along a very small peat valley bottom among a network of shallow, braided channels and are growing on bare soil in moist to wet, muddy soil in small openings in graminoid-dominated vegetation. The area shows evidence of low-level natural disturbance, as evidenced by areas of bare soil, likely resulting from channel dynamics.

Whitebark pine (*Pinus albicaulis*)

This 5-needle white pine has broad distribution at high elevation and timberline zones throughout the mountains of western North America (NatureServe 2012). While the species has a broad geographic range, precise data on the abundance and distribution of stands is limited and there is a high level of uncertainty regarding stands on LTBMU. Estimates of the abundance of whitebark pine on LTBMU range from approximately 1,500 acres to over 24,000 acres; the methodology of how estimates were produced, and maps of estimated distribution within the project and analysis area are provided in the project's Biological Evaluation of Botanical Species.

Mortality data collected in multiple studies throughout its range strongly suggest that whitebark pine is in range-wide decline (Keane et. al. 2012; US Fish and Wildlife Service 2011). The primary threat to whitebark pine across its range is a synergistic combination of climate change, white pine blister rust (WPBR), periodic mountain pine beetle (MPB) outbreaks and fire

exclusion (Keane et. al. 2012; Millar et. al. 2004; US Fish and Wildlife Service 2011). When compared to other parts of the range, such as the Rockies, California has experienced relatively low mortality of whitebark pine, potentially due to the lower incidence of WPBR (Dunlap 2010; Millar et. al. 2012).

Surveys indicate that whitebark pine is present in the project area within Freel and Star meadows. However, the surveys do not delineate these areas, so their exact extent within the project area is not clearly defined. Instead, estimation methods (outlined in project's Biological Evaluation of Botanical Species) were utilized to estimate stand acreage for the project area.

Table 3-5. Estimations of whitebark pine extent in project area (acres).

	eVeg			TEUI		
	WBP Dominated	WBP Probable	Total	WBP Dominated	WBP Probable	Total
Project Area	0	89	89	36	8	44

Species with suitable habitat, but not known to occur in the project area

During surveys of the project area, suitable habitat was identified but no occurrences were found for species listed in Table 3-6. Discussion of effects to these species is described by habitat type.

Table 3-6. TEPCS botanical species with suitable habitat, but no known occurrences in project area

Scientific name	Common name	Habitat type	Baldwin	Benwood	Freel	Hell Hole	Meiss	Star
<i>Boechera tularensis</i>	Tulare rockcress	upland						Suitable
<i>Botrychium ascendens</i>	upswept moonwort	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Botrychium crenulatum</i>	scalloped moonwort	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Botrychium lineare</i>	slender moonwort	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Botrychium lunaria</i>	common moonwort	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Botrychium minganense</i>	Mingan moonwort	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Botrychium montanum</i>	western goblin	meadow	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Dendrocollybia racemosa</i>	branched collybia	upland		Suitable		Suitable	Suitable	
<i>Draba asterophora</i> var. <i>asterophora</i>	Tahoe draba	upland						Suitable
<i>Draba cruciata</i>	Cup Lake draba	upland						Suitable
<i>Helodium blandowii</i>	Mineral King draba	fen		Suitable	Suitable	Suitable		Suitable
<i>Hulsea brevifolia</i>	short-leaved hulsea	upland	Suitable	Suitable		Suitable	Suitable	Suitable
<i>Meesia uliginosa</i>	broad-nerved hump-moss	fen	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
<i>Peltigera gowardii</i>	Goward's water fan	meadow		Suitable				Suitable

Meadow habitat

Meadows are groundwater-dependent ecosystems that rely on the persistence of a shallow water table, generally at a depth of less than one meter, throughout the growing season (Lowry et. al. 2011; Ratliff 1985; Weixelman et. al. 2011). As detailed in Chapter 2, montane meadows have

been identified among the most vulnerable and impacted habitat types of the Sierra Nevada (Kattelman and Embury 1996). The processes that control the natural range of variability (NRV) within meadows have been altered by fire, grazing, hydrologic changes, climate change, trails and recreation, and changes in biological structure, composition, and diversity (Gross and Coppoletta 2013).

Fen species and habitat

Fens are ground-water dependent peat-accumulating wetlands (i.e. a subset of meadow habitat) typically saturated for the entire growing season (Bartolome et. al. 1990). Fens are among the most sensitive plant communities identified during ecological assessments of the Sierra Nevada (USDA Forest Service 2004). Compared to other habitats in the Sierra Nevada, fens support a disproportionately large number of rare vascular and nonvascular plants species (Sikes et. al. 2010; Weixelman and Cooper 2009). Fen integrity is inherently tied to maintenance of the hydrologic conditions that support peat accumulation, which occurs on the order of 4-16 inches per 1000 years (Cooper 1990, Chimner and Cooper 2003). Since fens are groundwater-reliant, any disturbance that significantly impacts water quantity or quality is considered a threat. Because fens require thousands of years to develop, they cannot easily be restored once damaged or destroyed.

Eleven fens have been delineated within the project area totaling approximately 35 ac: two in Baldwin (3.9 ac); two in Freel (3.0 ac); four in Hell Hole (19.3 ac); and three in Meiss (8.8 ac). There are no fens documented in Benwood or Star Meadows. Seven watch list sphagnum moss (*Sphagnum spp.*) occurrences are documented in the project area. The Sphagnum moss occurrences in this project are restricted to fen habitat. A more detailed assessment of the project's impacts to fens is included in project's Other Botanical Resource Assessment.

Upland habitat

Upland habitat in the analysis area consists primarily of conifer forests, dominated by lodgepole pine, red fir, Jeffrey pine, whitebark pine, subalpine mixed conifer or sierra mixed conifer (USDA Forest Service 2009). Throughout the analysis area, this habitat type is locally abundant and is much more common than meadow or fen habitat.

Environmental Consequences

Many of the project activities have similar indirect and cumulative effects on all TEPCS botanical species so they are discussed generally and pertain to all species analyzed. Where appropriate direct effects are described by species and/or habitat type. Effects are displayed first by habitat types and then for the two TEPCS botanical species found within the project area for each of the two alternatives.

Cumulative Effects

The effects of past actions on TEPCS botanical species in the analysis area are largely unknown. Data describing the past distribution and abundance of rare plant species is very limited. Some species have always been rare due to particular ecological requirements or geographic isolation (Ornduff et. al. 2003; Shevock 1996). However, the Lake Tahoe Basin sustained perhaps the most intensive land use of any watershed in the Sierra Nevada during the height of commercial land uses that occurred throughout much of the range in the late 1800s and early 1900s (Manley et. al. 2000). Those past actions involving ground disturbance (e.g. gold and gravel mining, timber harvest, road construction, and recreational off-highway vehicle use) and hydrological alteration (e.g. diversions, ground-water pumping) have reduced the abundance and distribution of TEPCS individuals and degraded their suitable habitat.

There are numerous past, present and foreseeable future projects and ongoing activities within the analysis area, including road, trail, and parking improvements, stream restoration projects, and vegetation and fuels management projects. The quantity and spatial extent of these projects and activities are detailed in Appendix D. Past, present, and future activities have and will continue to alter TEPCS botanical species populations and their habitats to various degrees; however, the approach taken in this analysis is that, if direct and indirect adverse effects resulting from the project are minimal or would not occur, then they would not contribute substantially to cumulative effects on the species.

On NFS lands—which constitute the vast majority of the analysis area, current projects incorporate project design features to avoid or mitigate negative effects to known occurrences (e.g. field surveys, protection of known rare species occurrences, SEZ restrictions, and invasive plant management). Therefore, the contribution to cumulative effects of these projects is likely to be minimal or similar to those described in this analysis. Future projects on NFS lands will undergo site-specific analysis and be subject to the LRMP's design criteria which include managing sensitive plants to ensure that species do not become threatened or endangered because of Forest Service activities. Projects on non-NFS lands are subject to the resource protection measures prescribed by TPRA (Tahoe Regional Planning Agency 2012). As such, the effect of future projects would also likely be minimal or similar to those described in this analysis, if existing management guidelines are applied.

Alternative 1

Meadow habitat

Conifer removal

Conifer encroachment can degrade meadow habitat by displacing graminoid vegetation and can eventually result in conversion to upland habitat, particularly lodgepole pine forest (Helms 1987; Vale 1987). The higher species richness and graminoid cover characteristic of meadows (compared to adjacent forest) can be difficult to recover after conifer encroachment (Haugo and Halpern 2007). As described in Chapter 2, without implementation the proposed activities (i.e. no-action alternative), conifer encroachment is expected to continue. As such, the no-action alternative could reduce the quantity or quality of meadow habitat in the project area (533 acres) and negatively affect TEPCS botanical species that utilize this habitat in the long-term.

Prescribed fire

The expected fire return interval for high severity fires in Sierran meadows is approximately 250-350 years—much greater than adjacent forests—and is still considered to be within the natural range of variability (Gross and Coppoletta 2013). However, if surrounding forests are not restored to a more frequent fire return interval, the risk of high severity wildfire increases and the risk to meadows also increase, though this is a very low risk. On the scale of the project area, it is difficult to predict the likelihood of high severity fire, so the timeframe of this potential effect is unknown.

Head cut repair

Stream incision affects meadow hydrology by changing the pattern of water flow, decreasing meadow moisture (Loheide and Gorelick 2007). Channel incision lowers groundwater and reduces overland flow frequencies; furthermore, such conditions encourage the conversion to dry meadow vegetation (Micheli and Kirchner 2002). Channels occur in each of the meadows in the project area and incision varies by meadow, with the most obvious head cutting occurring at Freel

Meadow. Without implementation of the proposed head cut repairs, meadow habitat in the project area (533 ac) is at risk of drying out and TEPCS botanical species that utilize this habitat may be negatively affected in the long-term.

Reestablishment of Meiss Corral

Non-implementation of this project activity is not expected to affect meadow habitat.

Trail reroute (Meiss Meadow)

Trails can function similarly to hydrologic channels, concentrating water flow and resulting in muddiness, water runoff, and soil erosion (Monz et. al. 2010). This can impede meadow hydrology and degrade meadow habitat in the long-term. In Meiss Meadow (285 ac total), approximately 1.1 miles of trail intersect meadow habitat. Without implementing proposed trail reroute and trail decommissioning, habitat adjacent to the current trail would remain at risk of degradation.

Willow planting

Non-implementation of this project activity is not expected to affect meadow habitat.

Fen habitat

Conifer removal

Similar to meadow habitat, conifer encroachment can result in displacement of fen vegetation and fen drying which would degrade fen habitat in the long-term. Because it takes thousands of years for fens to develop, those degraded by conifer encroachment or drying may not recover. As described in Chapter 2, without implementing the proposed activities (i.e. no-action alternative), conifer encroachment would continue in the project area.

Prescribed fire

Fen habitat is generally too saturated to effectively burn in low to moderate severity fires; the fire return interval is likely similar to or greater than meadow habitat. The risk to fens is similar, though likely even lower than that risk to meadow habitat described above.

Head cut repair

The development of channels that act as ditches can lower fen water tables and dry fen areas, resulting in the oxidation of peat and further tree invasion (Chimner and Cooper 2003; Fisher et. al. 1996; Glaser et. al. 1990). Gullies and head cuts are a very serious impact to fens because they may dewater them, removing the perennially saturated condition that defines them (Cooper et. al. 1998; Cooper and Wolf 2006). Drying also makes the peat body extremely flammable and the loss of large amounts of peat to fire is possible (Cooper and Wolf 2006). There are no fens in the project area that are currently directly at risk of degradation from head cuts. However, if these head cuts are not repaired and persist or expand, upstream fen habitat (35 ac) could be negatively impacted in the long-term.

Reestablishment of Meiss Corral; willow planting; trail reroute (Meiss Meadow)

Non-implementation of these project activities is not expected to affect fen habitat.

Upland habitat

Conifer removal

Analysis of forest structure and fire scars in the Lake Tahoe Basin suggest that its contemporary forests have more and smaller trees, more basal area, less structural variability, and trees with a more clumped spatial distribution than pre-settlement forests (Taylor 2004). Higher stand

densities have resulted in higher risk of bark beetle and higher severity fires (Miller et. al. 2009). As such, failure to remove small diameter conifers represents a risk of degrading upland habitat in the project area (172 ac) in the long-term.

Prescribed fire

Forests in the Lake Tahoe Basin are severely departed from historic fire conditions, with most of the Basin characterized as moderately or severely departed from historic fire return intervals (i.e. expected number of years between fires) (Manley et. al. 2000; Taylor 2004). If forested habitat is not restored to a more frequent fire return interval, the risk of high severity wildfire increases and there is a risk of degrading upland habitat in the long-term.

Head cut repair; Reestablishment of Meiss Corral; willow planting; trail reroute (Meiss meadow)

Non-implementation of these project activities is not expected to affect upland habitat.

Whitebark Pine

There will be no direct effects to whitebark pine from Alternative 1.

The indirect effects to upland habitat described in the upland habitats section apply to Whitebark pine. In addition, the failure to remove small diameter conifers may result in a reduction in growth and vigor and increase in mortality in whitebark pine stands.

There is not expected to be cumulative effects to whitebark pine from implementation of Alternative 1.

Bolander's Candle-moss

There will be no direct effects to Bolander's candle-moss from Alternative 1.

The indirect effects to meadow habitat described in the habitat section apply to Bolander's candle-moss for both Alternative 1, however it is not expected that additional indirect effects to Bolander's candle-moss will occur.

There is not expected to be cumulative effects to Bolander's Candle-moss from implementation of Alternative 1.

Alternative 2

Invasive Species

Invasive species are considered the second leading cause of native species decline and extinction in North America, behind habitat loss (Wilcove et. al. 1998). Proposed activities may facilitate the introduction of invasive plants and put TEPCS botanical species at risk. Invasive plants can directly compete with TEPCS botanical species for nutrients, light, and water or indirectly affect these species through alteration of habitat characteristics, such as nutrient cycling or fire regimes (Bossard et al 2000). A detailed assessment of the risks of invasive plant introduction and spread associated with the project as well as the project's invasive plant management requirements can be found in the project's Invasive Plant Risk Assessment. Overall, the project represents a low risk of invasive plant introduction and spread, mostly at Baldwin Meadow.

Meadow habitat***Conifer removal***

As discussed under Alternative 1, conifer encroachment degrades meadow habitat, so conifer removal is expected to improve meadow habitat in the long-term. However, during conifer removal, meadow vegetation may be trampled or damaged by falling trees in the short-term in the meadow treatment areas (533 ac). Because removal would be conducted via hand thinning, damage would be limited in intensity. The graminoid vegetation characteristic of meadows is relatively resistant to such impacts and is not expected to be degraded to a degree that it would not support TEPCS species.

Prescribed fire

Fire intensity is expected to be low to moderate and limited in duration, with the potential to partially restore meadow habitat to a more natural fire return interval. Prescribed fire may also enhance meadow vegetation vigor and diversity as well as kill conifer seedlings and saplings which would reduce future encroachment. However, burn preparation—particularly fireline construction and piling of cut trees and slash—has the potential to damage meadow habitat by trampling, uprooting, or covering vegetation and creating new channels for water flow that may disrupt meadow hydrology. The following project design features would minimize this risk: pile burning will be concentrated at the meadow boundary when feasible; fireline would be constructed by hand and minimized where possible through the use of wet line and existing roads and trails as fireline; and all constructed fire lines would be rehabilitated after implementation.

Head cut repair

As discussed under Alternative 1, failure to address head cutting can potentially degrade meadow habitat. As such, head cut repair is generally considered beneficial to meadow habitat. Like other proposed activities, there is still potential that meadow vegetation will be trampled during head cut repair or during the cultivation of on-site revegetation materials, but the graminoid vegetation characteristic of meadows is relatively resistant to such impacts and is not expected to be degraded to a degree that it would not support TEPCS species.

Reestablishment of Meiss Corral

This project activity is not expected to affect meadow habitat.

Willow planting

Willow planting is focused primarily on restoring wildlife habitat. It may alter the composition and distribution of meadow vegetation, including expansion of willows and some removal of graminoids, but is not expected to alter meadow habitat to a degree that it would not support TEPCS species.

Trail reroute (Meiss Meadow)

As discussed under Alternative 1, trails adjacent to meadow habitat can alter meadow hydrology. The proposed reroute to higher capacity land and decommissioning of the current trail alignment—though low-lying portions of Meiss Meadow (~1.1 mile)—would improve quality of meadow habitat in both the short- and long-term.

Fen habitat

Due to the length of time it takes fen soil to develop (it can take thousands of years), fens will be designated as ‘botanical treatment areas’ where all ground disturbing activities will be excluded, but in which other project activities will be allowed (see Chapter 2 botanical RPMs).

Other botanical resources affected by the proposed activities with fen habitats include seven watch list sphagnum moss occurrences and 11 fens. The Sphagnum moss in this project is restricted to fen habitat and subject to all the potential effects to fen habitat described above in the “General Effects to TEPC Botanical Species” section; the 11 fens are subject to these same effects as well. As part of the planning process, project design features and resource protection measures have been incorporated in the project to protect fens from direct effects and address indirect effects to their hydrologic regime. No additional RPMs are included in the project’s decision document to address sphagnum moss because the fen RPMs are also expected to minimize risk to sphagnum moss.

Conifer removal

As discussed under Alternative 1, conifer encroachment can potentially degrade fen habitat, so conifer removal is expected to improve fen habitat in the long-term. However, during conifer removal, fens may be trampled or damaged by falling trees. Due to the complexity and long duration of their formation processes, fens are far less resilient to such impacts than other habitat types and may not recover in the short- or long-term. To minimize this risk, fens will be identified on project maps and flagged prior to implementation, foot traffic will be minimized, and felled trees will not be dragged through fens.

Prescribed fire

As discussed under Alternative 1, prescribed burning is expected to have minimal long-term effect on fens. However, during burn preparation—particularly fireline construction and piling of cut trees and slash, there is potential to trample or otherwise damage fen habitat, which may not recover in the short- or long-term. To minimize this risk to fens, piles will only be located in areas designated by a staff botanist or ecologist prior to implementation and ignition and construction of fireline is prohibited within fens. In addition, if fuels treatments are conducted in a fen, then the fen will be monitored pre- and post-project implementation, unless there is sufficient evidence to support that the treatment will not adversely impact the fen.

Head cut repair

As discussed under Alternative 1, failure to address head cutting can potentially degrade fen habitat. As such, head cut repair is generally considered beneficial to fen habitat. Like other proposed activities, there is still potential that fen vegetation will be trampled during head cut repair or during the cultivation of on-site revegetation materials and recovery may not occur in the short-term. To minimize this risk, fens will be identified on project maps and flagged prior to implementation and foot traffic will be minimized.

Reestablishment of Meiss Corral

This project activity is not expected to affect fen habitat.

Willow planting

Supplemental willows will not be planted within fens; as such, this project activity is not expected to affect fen habitat.

Trail reroute (Meiss Meadow)

The proposed trail reroute in Meiss Meadow occurs within 200 feet of two known fens (5.6 ac); there are no other fens nearby. However, both the existing trail and the proposed reroute are downstream of these two fens. Trails and roads upstream of fens can divert flows and disrupt fen

hydrologic regimes (Weixelman and Cooper 2009). However, because the reroute is below the fens, it will not likely affect fen habitat.

Upland habitat

Changes in forest composition and health are detailed in the “Forest Vegetation” section of Chapter 3.

Conifer removal

As discussed under Alternative 1, failure to remove conifers from upland habitat can potentially degrade upland habitat. Removal of small diameter trees would result in less competition for resources for other vegetation, namely large diameter trees that are important ecological components of upland habitat. Conifer removal would also reduce fuel loads and ladder fuels reducing the risk of high severity fires. As such, conifer removal is generally considered beneficial to upland habitat. While upland vegetation may be trampled during conifer removal in the short-term, this is unlikely to degrade upland habitat to a degree that it would not support TEPCS species.

Prescribed fire

As discussed under Alternative 1, failure to reintroduce low to moderate severity fire can potentially degrade upland habitat. Prescribed fires represent a lower risk to upland habitat than high severity fires for several reasons: lesser likelihood of fatal damage to vegetation; shorter timeframe to suitable habitat recovery due to canopy plant mortality and/or burning of soil organic material; and lower risk of post-fire erosion.

Head cut repair; reestablishment of Meiss Corral; willow planting; trail reroute (Meiss Meadow)

These project activities are not expected to affect upland habitat.

Whitebark Pine

Direct effects can be expected on Whitebark Pine from implementation of Alternative 2. Up to 892 ac of conifer removal is proposed, of which up to 89 ac is estimated to contain whitebark pine, mainly near Freel and Star Meadows. Individual whitebark pine trees may be removed within the entire project area, though removal is limited to small diameter and diseased trees. During prescribed fire, individual trees may be scorched or burned, resulting in bark and bole charring, lower branch die-off, and in some instances—particularly for seedlings and saplings—tree mortality. The following Resource Protection Measures for this project substantially minimize risk to healthy whitebark pine trees: the retention of whitebark pine over all other tree species; the retention of all whitebark pine trees or clusters containing at least one tree 18 inches dbh or greater; the retention of whitebark pine clusters containing at least two trees 12 inches dbh or greater; and the removal of diseased trees of any species.

The indirect effects to upland habitat described in the “General Effects to TEPCS Botanical Species” section apply to whitebark pine for Alternative 2 with additional indirect effects expected in the removal of diseased trees may reduce the risk of pathogen spread to healthy whitebark pine stands and provide a small beneficial effect.

Cumulative effects common to all TEPCS botanical species are described above in the habitat sections, however, while substantial tree removal is proposed (up to 892 ac), most of the removal is not proposed within whitebark pine stands (up to 89 ac). In the context of the estimated abundance of whitebark pine on LTBMU (between 1,500-24,000 ac), the affected whitebark pine

stands represents less than 0.05% of known LTBMU stands. As such, the project's direct and indirect effects—both negative and beneficial—are not considered significant. Although it represents the best available science, this estimate of relative affected area should be considered in the context of the low accuracy of the LTBMU abundance estimates; there remains a high degree of uncertainty about the abundance and distribution of whitebark pine on LTBMU.

Regarding the health of LTBMU's whitebark pine stands, there has not been a unit wide assessment. White pine blister rust has been detected in periodic aerial detection surveys (Heath et al. 2012). Survey plots near Freel Peak characterize that area with a relatively low incidence of white pine blister rust (Maloney et al. 2012). It is unclear what effect this will have on the stands in the project area.

Past projects in the analysis area did not specifically analyze effects to whitebark pine; it only became a candidate for listing under ESA in late 2011 and was only added to the Forest Service Sensitive list in 2013. However, past actions have undoubtedly resulted in removal of individual whitebark pine trees. Currently, there is no LTBMU or R5 conservation strategy for whitebark pine, no unit or regional standard management measures have been developed, and there are no species-specific management requirements outlined in the current LTBMU LRMP (USDA Forest Service 1988). As such, the future management of whitebark pine is difficult to fully assess. Nonetheless, future projects on NFS lands will undergo site-specific analysis and be subject to the LRMP's design criteria which include managing sensitive plants to ensure that species do not become threatened or endangered because of Forest Service activities.

When considered in the context of the effects of other past, present, and reasonably foreseeable future actions, the project is not expected to contribute significantly to a loss of species viability.

Bolander's Candle-moss

Direct effects from Alternative 2 on Bolander's candle-moss are limited, as there is currently only one known occurrence, consisting of ~0.30 ac in Hell Hole Meadow. Because restoration of natural processes through the proposed activities is considered beneficial to Bolander's candle-moss, occurrences will be designated as 'botanical treatment areas' where all ground disturbing activities will be excluded, but in which other project activities are allowed. There is potential to trample, uproot, or otherwise damage individuals during project activities. To minimize this risk, the following restrictions are incorporated into project design: occurrences will be identified on project maps and flagged prior to implementation; piles will not be constructed or burned within 20 feet of plants; ignition and construction of fireline is prohibited; foot traffic is minimized; and supplemental willows will not be planted.

There is also a very low risk that escaped prescribed burns may burn individual plants. However, the fire intensity is expected to be low to moderate and limited in duration due to the saturated conditions of meadow habitat. In addition, project design features (e.g. concentrating burn piles at meadow boundaries, manipulation of fuels to reduce impacts to individuals during prescribed fire treatments) and existing FS procedures for conducting prescribed burns (e.g. development of a burn plan, fireline construction, onsite personnel during burn operations) are in place to reduce the risk of escape.

Indirect effects from Alternative 2 on Bolander's candle-moss may benefit from the proposed ground disturbance associated with proposed burning and head cut repair because it colonizes bare soil in wetter habitats and may expand in the short-term.

Cumulative effects from Alternative 2: Bolander’s candle-moss has likely lost individuals and a considerable amount of suitable habitat over the past 100 years due to land use activities such as water diversions, habitat type conversion (i.e. meadow to annual grassland), intense grazing by domestic livestock, and construction of roads and trails. However, it remains widely distributed across its range—occurring in Oregon, California, Nevada and Utah—as well as across the administrative unit—occurring from Incline Lake to Hell Hole Meadow (California Native Plant Society 2012). With the exception of some land use activities (e.g. off highway vehicle use, fire suppression, etc.), protection measures for meadows in the Lake Tahoe Basin have generally been in place for nearly 25 years (Tahoe Regional Planning Agency 2012; USDA Forest Service 1988). Given that there are seven known occurrences of Bolander’s moss and extensive suitable habitat for the species on LTBMU, the scope and scale of indirect effects to meadow habitat from the proposed activities are considered limited. When considered in the context of the effects of other past, present, and reasonably foreseeable future actions, the project is not expected to contribute significantly to a loss of species viability.

Analytical Conclusions

Table 3-7 provides a summary of botanical resource indicators by alternative. For TEPCS botanical species utilizing meadow and fen habitat, there are potential negative short-term and long-term effects associated with the proposed conifer removal, burning, or head cut repair, including one Bolander’s candle-moss occurrence. However, not implementing the proposed conifer removal, burning, head cut repair or trail reroute could also result in long-term indirect negative effects to meadow and fen habitat. For TEPCS botanical species which utilize upland habitat, the proposed activities do not represent substantial risks, though individual whitebark pine may be damaged or destroyed in the short-term. However, not implementing the proposed conifer removal and burning may result in long-term indirect negative effects to upland habitat.

While there are potential negative and beneficial effects to botanical resources from both alternatives, when considered in the context of other past, present, and reasonably foreseeable future actions, the effects to botanical resources are considered less than significant for both alternatives.

Table 3-7. Summary of Botanical Resource Indicators By Alternative

Botanical Resource Indicator	Alternative 1 (No action)	Alternative 2 (proposed action)
Acres of Bolander’s candle moss occurrences affected by proposed activities	0 (0)	up to 1 (0.30 ac)
Acres of whitebark pine affected by proposed activities	0	up to 89 ac
Acres of fens affected by proposed activities	0	up to 35 ac

Cultural Resources

Introduction

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires that federal agencies take into account the effects of a federal undertaking on any cultural resource that is included in, or eligible for, inclusion in the National Register of Historic Places (NRHP). Cultural resources may refer to sites, areas, buildings, structures, districts, and objects which possess scientific, historic, and/or social values of a cultural group or groups as specified by 36 CFR 296.3.

The United States Forest Service (USFS) as a public land steward is mandated to comply with Section 106, as amended (NHPA) (16 USC 470) and its implementing regulations, entitled Protection of Historic Properties (36 CFR part 800.)

NRHP eligibility is evaluated in terms of the integrity of the resource; its association with significant persons, events, or patterns in history or prehistory; its engineering, artistic, or architectural values; or its information potentially relative to important research questions in history or prehistory (36 CFR Section 60.4.) The significance of NRHP eligibility of cultural resources is determined by the Forest Archaeologist/Heritage Program Manager (HPM) in consultation with the State Historic Preservation Officer (SHPO).

The Lake Tahoe Basin (LTBMU) has signed onto the Programmatic Agreement (PA) among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Processes for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region (R5 PA). This programmatic agreement expedites the Section 106 process with the understanding that the Forests have professional staffing and an extensive history of compliance with the provisions of 36 CFR part 800 and the Forest HPM can ensure appropriate oversight and application of PA stipulations on undertakings that are within the scope of requirements set forth by the document. Projects outside of the scope of the PA will require standard consultation with SHPO.

The Areas of Potential Effects (APE) for this analysis are all within the LTBMU's boundary, and is primarily confined to five high alpine meadows (Benwood, Freel, Hellhole, Meiss and Star); additionally Baldwin Meadow (which is adjacent to the southwest shore of Lake Tahoe) will also be treated as part of this undertaking.

Twelve archaeological inventories have been conducted within the project area in the past. All inventories are on file at the LTBMU Heritage Department. These inventories vary from larger block inventories to much smaller and less extensive surveys, covering specific footprints such as trails and vegetation treatments.

Methodology

Archival research for the project overview and specific site history was conducted by Thomas L. Fuller of the LTBMU Heritage Department. Archival research consisted of reviewing LTBMU heritage survey reports, historic maps, Geographic Information Systems (GIS) database and the USFS Heritage database in I-Web.

Additionally, a new pedestrian survey was conducted in the Benwood Meadow and Marsh areas to see if drought-like conditions could expose any cultural resources in marsh areas previously not surveyed due to wetlands conditions.

Assumptions

In the analysis for this resource, the following assumptions have been made:

- The wetlands of the Hellhole treatment area were not surveyed for cultural resources because they were determined to be unsurveyable due to the marsh like environment.
- All cultural resources that are unevaluated within the APE of the Restoration of Fire Adapted Meadows Project will be flagged prior to implementation by LTBMU Heritage staff and avoided during the project.
- The old Meiss Road has been previously evaluated for the NRHP and was determined to be “not eligible” and will not require any cultural resource protection measures during project implementation.
- The Meiss Cabin/Barn/Corral complex is eligible for the NRHP and will be protected during implementation - with the exception of the corral, which will be re-constructed using logs from lodgepole trees that are to be removed during this project.

Overview of the Affected Environment

As per the twelve previous archaeological inventories, 16 previously recorded cultural resources are known to exist within the APE—most of which have not been evaluated for the NRHP. The prehistoric sites are not threatened by conifer encroachment, but could possibly be impacted by head cuts and the resulting bank instability at some future date. The two historic sites are not threatened by conifer encroachment, but the Meiss Cabin is in imminent danger of being impacted by bank instability of the Upper Truckee River and head cut repair in the Upper Truckee might assist with this problem.

Activity: Proposed project activities of conifer removal, prescribed fire and head cut stabilization could affect cultural resources during implementation.

- Baldwin Meadow – One historic site, the ruins of the Ebright Dairy. Although the total acreage of the site is substantial, there are seven individual loci that would need to be protected, representing no more than 3 total acres within the site. Work can be done around and within the flagged loci, but burn piles would need to be placed at a distance away from the loci that the Forest HPM would approve and possibly have Heritage staff onsite during implementation to monitor treatments and burning.
- Benwood Meadow – no sites within the project area.
- Freel Meadow – Two prehistoric sites, less than two acres, but neither site is within the treatment area, only in/or adjacent to the buffer areas. Sites will be flagged and avoided.
- Hellhole Meadow – no sites recorded within the project area.
- Meiss Meadow – One historic Site, 10 prehistoric sites, one non-eligible linear historic site within project area. Most of the prehistoric sites only have a few lodgepole trees within them at most. The prehistoric sites will be flagged, but can have tree removal within the flagged site boundaries. Any felled trees are to be bucked up and removed by hand outside of the site boundary (carried, no dragging.) Prescribed fire will be kept out of the sites by the use of hand lines and black-lining the boundaries. The total acreage of the prehistoric sites within the treatment area is approximately five acres. The Meiss Cabin Complex is to be protected during implementation; lodgepoles can be removed and used to reconstruct the corral.

- Star Meadow – One prehistoric site, 1.5 acres, encompassing 1.1 acres of the treatment area. Again, the sites will be flagged, any felled trees are to be bucked up and removed by hand outside of the site boundary (carried, no dragging.) Prescribed fire will be kept out of the sites by the use of hand lines and black-lining the boundaries.

Environmental Consequences

Alternative 1 (No Action)

Direct and Indirect

Taking the no action alternative would result in leaving most of the prehistoric and historic sites in the project area in their current condition. The Meiss Cabin Corral will continue to decay and could not function as a corral. The Meiss Cabin is threatened from further erosion of the Upper Truckee River bank immediately adjacent to the cabin. No long term threat to prehistoric or historic sites from conifer encroachment of meadows. Head cut expansion could threaten surface and sub-surface archaeological context of sites. Meiss Corral would continue to exist in a state of active decay.

Cumulative

There are no other projects planned within the vicinity of cultural resource sites, so no cumulative effects to cultural resources would occur.

Alternative 2 (Proposed Action)

Direct and Indirect

Tree Removal

A main goal of this project is to reduce conifer encroachment upon meadows in the Lake Tahoe Basin. Trees less than 18 inches in diameter at breast height (dbh) within the treatment areas will be felled by hand and trees larger than 18" dbh could be girdled or encouraged to burn during prescribed fire operations by placing burn piles next to them.

Indicator 1: Tree removal activities within cultural site boundaries

The tree density within cultural site boundaries of this proposed project is very low, but the resulting ground disturbance of tree removal activities could damage surface and below surface site integrity. The resource protection measures for this project will be to flag off all unevaluated sites, ensure that trees felled within site boundaries are bucked up and hand carried outside of the site boundaries. Protect historic structures from impacts by large trees that eventually fall due to girdling.

Indicator 2: Crew activity within prehistoric and historic sites

As these sites will be flagged as cultural sites, it is imperative that crews understand that no artifacts are to be removed or moved within those sites.

Burning

Prescribed fire in the form of broadcast burning and burn piles is proposed with this project. Prescribed fire will be used primarily to remove small conifers and to enhance native riparian plant vigor and diversity. There would be no effects to cultural resources from the forest plan amendment portion of this project as all cultural resource sites would be avoided.

Indicator 1: Prescribed burns within cultural site boundaries

As fire is destructive to both prehistoric and historic sites, fire is to be excluded from within site boundaries, unless approved by the Forest HPM. Fire breaks may be constructed outside of the

site boundaries. Within sites fire breaks can be constructed as per the Forest HPM and fuels may be removed by hand and fire crews are to monitor the sites to provide protection as needed. Looting of prehistoric and historic artifacts could result from being exposed by lack of vegetation due to prescribed burns within cultural sites.

Indicator 2: Trees allowed to burn may fall on cultural site features

Large trees (18" dbh or more which are not initially felled, but encouraged to burn) that may impact prehistoric or historic features can be directionally felled away from the features prior to ignition.

Indicator 3: Unintentional prescribed burn over of cultural sites.

If prehistoric sites were accidentally burned over, the data potential from obsidian hydration analysis could be lost. Historic sites would lose wooden features and earthen features would be compromised.

Head cut Repair

No effects upon any sites currently. Head cut repair would be positive in the long run, helping to protect both prehistoric and historic sites from stream bank erosion.

Re-establishment of Meiss Corral

Indicator 1:

Meiss Corral could be rebuilt using lodgepoles that were felled by the project and could be a functioning corral again and retain its historic appearance. Disgruntled public who can no longer use large lodgepoles next to Meiss Cabin for tying up horses and taking advantage of the shade provided by those trees.

Packers and other horseman have been used to tying up animals under the lodgepoles next to the Meiss Cabin and might resist using the corral unless a shade break of some type was provided. But, use of the corral would reduce the soil erosion currently occurring under the lodgepoles, which are immediately adjacent to the Upper Truckee.

Re-routing trails

Indicator 1: Re-routing the Pacific Crest Trail in the Meiss Meadow area through prehistoric sites.

Cooperation between the LTBMU Trails department and LTBMU Heritage department will result in new trail alignments avoiding prehistoric sites.

Cumulative

Tree Removal

Indicator 1: No cumulative impacts from tree removal to prehistoric or historic sites since sites will be avoided.

Burning

Indicator 1: No cumulative impacts from burning because there are no other projects in the vicinity and all sites would be avoided.

Head cut Repair

Indicator 1: No cumulative impacts from head cut repair to prehistoric or historic sites since sites would be avoided.

Re-establishment of Meiss Corral

Indicator 1: No cumulative impacts from re-establishment of Meiss Corral because there are no other projects in the vicinity which would affect cultural resources.

Analytical Conclusions

Alternative 1 (No Action) will result in little change to the condition of prehistoric and historic sites within the project area. Ebright Dairy historic site will continue to be in a state of ruins, Meiss Cabin and Barn will continue to be preserved as before, but the Meiss Corral will not be rebuilt and erosion will continue around the lodgepoles near the cabin which are currently used to tie up horses. Prehistoric sites might be impacted by expanding head cuts, but no sites are currently thought to be threatened by head cuts.

Alternative 2 (Proposed Action) would have the positive effect of the Meiss Cabin Corral being rebuilt using lodgepole logs that will be produced by the project. The head cut repairs will stabilize stream banks and could possibly prevent erosion that could impact prehistoric and historic sites.

Any possible negative impacts to cultural resources during project implementation can be avoided by employing these standard resource protections:

1. Flag and avoid known sites during implementation, create hand lines outside of the boundaries prior to prescribed burns, black line the hand line first if possible.
2. If it is desired to remove trees from within site boundaries, determine if the tree can be felled with minimal ground disturbance, then after felling - buck up the tree and remove from the site by hand (no dragging) and do not make burn piles within site boundaries unless approved by the Forest HPM.
3. Plan location of new PCT with Heritage staff to avoid cultural resources.

Considering the overall natural resource benefits that this project will achieve and the additional benefit of the Meiss Corral being rebuilt; the risk of damage to cultural resources within the project APE should be sufficiently mitigated by employing the standard resource protection measures listed above.

Forest Vegetation

Introduction

This section discusses the effects to coniferous forest vegetation in the project area. The potential effects to vegetation in the meadows are discussed in the Botanical Resources section(s).

Methodology

Evaluation of potential effects on forest vegetation is based on management activities as described in the proposed action. Proposed activities will modify current conditions, both within identified meadows and in the forested areas surrounding them. This analysis evaluates effects to coniferous vegetation based on stand densities, species composition, and stand health.

Overview of the Affected Environment

Forested areas surrounding the meadows are variable for each meadow area, but the periphery of each meadow is basically the same usually with highly dense stands composed primarily of lodgepole pine. Variable tree mortality exists, mainly from high densities and mountain pine beetle. Much of the high densities are due to fire suppression activities that have occurred over the past 100 years. Beyond the meadow periphery, tree species range from mixed conifer including lodgepole pine, Jeffrey pine, and white fir in the lower elevations, to western white pine and red fir in the higher elevations. White bark pine is also found in at least two of the high elevation meadow areas (Freel and Star meadows). Densities are typically lower in the higher elevation areas with patchy size class distribution attributed in part to the rocky terrain. Signs of insects and disease including Jeffrey pine beetle and white pine blister rust exist in most areas at endemic levels.

Environmental Consequences

Alternative 1 (No Action Alternative)

Direct Effects

There would be no direct effects on the coniferous vegetation in the project area.

Indirect Effects

Conifer forests would continue to increase in stand densities both by recruitment and growth of existing trees. In areas where the stand densities are already high and either at or approaching maximum occupancy for the forest type, there would be a reduction in growth and vigor and increase in mortality. Trees would become more stressed and more susceptible to insects and disease.

Cumulative Effects

There would be no cumulative effects beyond the indirect effects addressed above. The only area with foreseeable actions beyond this current proposed action is Baldwin meadow. This area will have hand thinning and burning under the South Shore Fuels Reduction and Forest Health project. The effects will be similar to the proposed action described below.

Alternative 2 (Proposed Action)

Direct Effects

The construction of the new trail alignments would have minimal effects to the upland conifer forests because the trail locations would generally avoid substantial conifer tree removal and would only lead to removal of minor amounts of understory plants and brush.

The removal of dead or dying conifers in the proposed treatment areas would not directly affect existing live conifers. In areas where live conifer trees are thinned and follow-up prescribed fire is conducted, there would be a reduction in tree density and canopy cover. The reduction would vary depending on the area's current condition and need for removal. Where stands of lodgepole pine are on edges of the meadow, most if not all would be removed. In upland areas that are already open, very few trees would be removed. For those open areas and the lodgepole pine stands along the meadow edge, residual densities would be at or below about 30% canopy cover post thinning and burning. Residual canopy closures in other areas would range between 30% and 40% with the exception of Benwood Meadow which includes a Home Range Core Area for which a minimum 50% canopy is desired. Damage to residual trees may occur from prescribed burning including scorching from convective heat or direct flame contact. This may result in charring of the bark and boles of the trees and mortality of the lower branches. Scorch or mortality of trees may occur in isolated areas (one or a few trees) to small patches up to approximately 1/10th of an acre in size.

The resulting stand structure would include healthy, dominant and co-dominant overstory trees with a few scattered smaller trees. Species composition would include a large reduction in the amount of lodgepole pine. Within the Jeffrey pine forests, a higher amount of Jeffrey pine would be retained and more of the shade tolerant white fir would be removed. The overall species mix that currently exists in the mixed conifer forests at higher elevations will remain about the same, but at lower densities. There will be only a slight decrease in the number of whitebark pine resulting in the retention of the largest and healthiest.

Indirect Effects

There would be beneficial effects to live conifer vegetation from the thinning and burning, including from the forest plan amendment which would allow burning closer to stream channels. The remaining trees would improve in overall health and vigor due to the increased availability of sunlight, moisture, and nutrients. Trees would increase in diameter and live foliage of the crowns and be better able to resist insect and diseases. With prescribed fire, mortality or damage to residual trees may occur depending on the severity of the damage or because they have become more susceptible to insect attacks. After the prescribed burning and over time, it is likely that regeneration of conifers would occur creating a multi-storied stand structure consisting of all the species that exist now including whitebark pine in some of the larger openings. It is expected that the white pine blister rust will continue to occur and spread where it currently exists. The thinning treatment may improve the ability for the whitebark pine to resist infection or the severity of the infection.

Cumulative Effects

Cumulative effects of the proposed action would be the combined acres of thinning and burning for the project with the addition of acres of hand thinning and burning under the South Shore Fuels Reduction and Forest Health project. The effects would be as described for "Direct" and Indirect" effects because stand and site conditions outside of the treated stands generally have little effect on treated stands, with the exception of insects and diseases. The proposed action would cumulatively reduce stand densities initially with gradual increases over time from growth of residual trees and recruitment from openings that are created.

Analytical Conclusions

The proposed action would result in stand conditions more similar to conditions that would have existed without fire suppression. The removal of lodgepole pine and white fir and preferential retention of Jeffrey pine would help to restore historic species composition. Conifer forests located at higher elevations would have little need for tree removal given the already open condition of most of the stands. The removal of any whitebark pine would be minimized and with all tree species, the reduction of stand densities would improve in overall health and vigor due to the increased availability of sunlight, moisture, and nutrients.

With the No-Action alternative, conifer forests would continue to increase in stand densities both by recruitment and growth of existing trees. In areas where the stand densities are already high and either at or approaching maximum occupancy for the forest type, there would be a reduction in growth and vigor and increase in mortality. Trees would become more stressed and more susceptible to insects and disease.

Hydrology and Soil

Introduction

The resource analysis area for the Restoration of Fire Adapted Ecosystems Project includes the Benwood Meadow, Headwaters of Trout Creek, Tallac Creek, Cold Creek, Saxon Creek and Headwaters of the Upper Truckee River watersheds.

The majority of the project area is located within meadow environments or a buffer area defined for this project surrounding the meadows. Within the Restoration of Fire Adapted Ecosystems Project area there are 590.7 acres of Riparian Conservation Areas (RCAs) and 472.4 acres of Stream Environment Zones (SEZs). RCAs are defined by the Sierra Nevada Forest Plan Amendment (SNFPA) surrounding streams, special aquatic features and other hydrological depressions (USDA Forest Service 2004). The RCA width is dependent on the stream or feature type rather than soils or vegetation present in the area. The RCA width for perennial channels is 300 ft on either side of the stream (measured from the bankfull edge of the channel), and for intermittent and ephemeral channels is 150 ft on either side of the stream. The RCA width surrounding lakes, fens and springs is 300 ft from the edge of the feature. SEZs are defined by the Tahoe Regional Planning Agency (TRPA) and the Lahontan Regional Water Quality Control Board (Lahontan Water Board) as biological communities that owe their characteristics to the presence of surface water or a seasonally high groundwater table. The criterion for defining SEZs includes indicators of vegetation, hydrology, and/or soil type (WQCP, 1995).

Methodology

The RCAs in the project area were measured from ephemeral, intermittent and perennial streams in the meadows, and also include buffers for waterbodies in the Baldwin, Benwood, and Hell Hole meadows based on the GIS stream layer. The majority of the project treatments occur within RCAs for this project, since the project area is comprised of meadows in need of conifer removal treatments.

SEZs are based on hydric soils (those which are adapted to a wet or moist environment) identified in the NRCS soil survey (2007) for the project area meadows, as detailed in Table 3-9 below.

Note: The acres within each project meadow that are occupied by a water body are included in the acres of RCAs, but not in the acres of SEZs, because no soil type is identified in those areas. Table 3-10 shows the miles of each stream type in each meadow (and buffer area).

Table 3-9. Restoration of Fire Adapted Ecosystems proposed treatment acres in Riparian Conservation Areas (RCAs) (USFS Sierra Nevada Forest Plan Amendment buffers) and Stream Environment Zones SEZs

Meadow	Proposed RCA Treatment Acres	Proposed SEZ Treatment Acres
Baldwin	32.2	121
Benwood	40	22.5
Freel	45.7	19
Hellhole	69	29.3
Meiss	347	280.6
Star	56.8	0

Table 3-10. Length of streams in Restoration of Fire Adapted Ecosystems project area.

Meadow	Ephemeral Stream Length (mi)	Intermittent Stream Length (mi)	Perennial Stream Length (mi)
Baldwin	0.4	0	1.19
Benwood	0.26	0	0.28
Freel	0.77	0	0.07
Hellhole	0.35	0	0.55
Meiss	4.47	0.82	2.14
Star	1.18	0	0

Note: all stream lengths are approximate and will be field verified prior to implementation.

Various activities associated with the project were analyzed for their effect on soil and water resources. Based on the activity being analyzed, resource indicators were identified to demonstrate whether or not an impact to resources would result from the project. The project activities considered in the soil and hydrology analysis and the indicators used to determine the effects of those activities are described below in the Environmental Consequences section.

Overview of the Affected Environment

The meadows included in this project area are in a degraded condition due to conifer encroachment, the presence of channel head cuts, and poorly located trail segments. Currently, the project area meadows have high fuel loads due to: 1) the recent history of fire suppression in this area, and 2) lodgepole pine and other conifer species encroaching in meadows and riparian areas, contributing to their degraded condition.

Several of the project area meadows have perennial and/or intermittent streams flowing through them. In some cases, head cuts have developed over time along these streams which have the risk of propagating further upstream and contributing to continued meadow drying. Head cuts may also lead to channel bank instability and water quality issues downstream.

Two existing trail segments of the Pacific Crest Trail through Meiss Meadow have been identified as impeding meadow hydrology due to their close proximity to the stream channel and degraded surface condition caused by their location in low-lying wet meadow areas.

Soils present within the project treatment areas are described below in Table 3-11. Hydric soils are those which are adapted to a wet or moist environment. For the purposes of this analysis, hydric soils are considered to represent SEZs in the project area. Prior to project implementation, SEZs will be field verified and delineated on the ground.

Table 3-11. Soils within the project area.

Meadow	Soil Map Unit	Soil Type	Acres	Hydric soil?
Baldwin	7011	Beaches	0.2	Yes
	7041	Tahoe complex, 0-2% slopes	41.4	Yes
	7042	Tahoe complex, 0-5% slopes, gravelly	32.6	Yes
	7071	Watah Peat, 0-2% slopes	31.7	Yes
	7451	Gefo gravelly loamy coarse sand, 2-9% slopes	11.3	Yes
	7452	Gefo gravelly loamy coarse sand, 9-30% slopes	1.1	Yes
	7524	Tallac gravelly coarse sandy loam, 0-5% slopes	1.4	Yes
	7525	Tallac gravelly coarse sandy loam, 5-9% slopes	1.3	Yes
Benwood	7041	Tahoe complex, 0-2% slopes	17.3	Yes
	7071	Watah Peat, 0-2% slopes	5.1	Yes
	7411	Cagwin rock outcrop complex, 5-15% slopes, extremely stony	0.1	Yes
	7487	Meeks gravelly loamy coarse sand, 5-15% slopes, rubbly	10.6	No
	7488	Meeks gravelly loamy coarse sand, 15-30% slopes, rubbly	0.7	No
	7489	Meeks gravelly loamy coarse sand, 30-70% slopes, rubbly	4.6	No
	7501	Rock outcrop-Rockbound complex, 5-30% slopes	12.7	No
	9404	Dagget very gravelly loamy coarse sand, moist, 5-15% slopes, rubbly	1.3	No
Freel	9001	Bidart complex, 0-2% slopes	19	Yes
	9421	Jobsis-Whittell-Rock outcrop complex, cool, 8-30% slopes	31	No
Hell Hole	7021	Hellhole peat, 0-2% slopes	29.3	Yes
	9401	Dagget very gravelly loamy coarse sand, 15-30% slopes, very bouldery	2.4	No
	9402	Dagget very gravelly loamy coarse sand, 30-50% slopes, very bouldery	2.4	No
	9404	Dagget very gravelly loamy coarse sand, moist, 5-15% slopes, rubbly	22.7	No
	9442	Temo-Witefels complex, 15-30% slopes	8.6	No
	9443	Temo-Witefels complex, 30-50% slopes	0.6	No
Meiss	7071	Watah Peat, 0-2% slopes	21.7	Yes

Meadow	Soil Map Unit	Soil Type	Acres	Hydric soil?
	7191	Rock outcrop, volcanic	0.1	No
	7501	Rock outcrop-Rockbound complex, 5-30% slopes	27.2	No
	9001	Bidart complex, 0-2% slopes	231.8	Yes
	9101	Callat very gravelly coarse sandy loam, 9-30% slopes, very stony	207.9	No
	9102	Callat very gravelly coarse sandy loam, 30-50% slopes, very stony	10	No
	9131	Lithnip-Meiss-Hawkinspeak association, 30-75% slopes	27.1	Yes
Star	9401	Dagget very gravelly loamy coarse sand, 15-30% slopes, very bouldery	42.2	No
	9402	Dagget very gravelly loamy coarse sand, 30-50% slopes, very bouldery	7.3	No
	9461	Whittell-Jobsis-Rock outcrop complex, cool, 30-75% slopes	6.5	No

Environmental Consequences

Alternative 1 (No Action)

Direct and Indirect Effects

The no action alternative would result in leaving the meadows in the project area in their current condition. Where head cuts exist along channels through project area meadows, they would remain and possibly worsen over time with no actions to repair them. Water quality degradation downstream of head cuts could also result from continued bed and bank erosion. Continued deterioration of existing head cuts could also result in further meadow drying. Conifer encroachment in these meadows would continue to occur without thinning activities and prescribed fire. Eventually, portions of the meadows may dry out and the vegetation community could shift towards drier site species, or possibly even transform into a forest environment.

Cumulative Effects

The cumulative effects of the no action alternative on soil and hydrologic resources are a continued drying trend of the project area meadows, and continuing propagation of head cuts on channels in the project area without repairs. The other projects considered for cumulative effects are expected to have positive results with regards to watershed health, but are primarily located outside of the actual treatment area of this project. Without reducing conifer density in project area meadows, and potentially worsening conditions of meadow drying due to propagation of existing head cuts further upstream, these areas would be more vulnerable to high intensity wildfire if this project is not implemented, particularly because several of the project area meadows are very popular recreation areas (e.g. Baldwin and Meiss Meadows). If a high intensity wildfire was to occur within the project area, it could result in significant water and soil quality impacts that could persist for several years.

Alternative 2 (Proposed Action)

Direct and Indirect Effects

Tree Removal

Tree removal activities by hand crews are proposed to reduce the density of conifers in the project area meadows and associated buffer areas. Hand removal methods are proposed for this project because of remote access and due to the large proportion of the project area located within SEZs (see Tables 3-9 and 3-11 above). Conifers may be removed completely within the meadows. Meadow buffers will be thinned to reduce future conifer seed sources into the meadow and to act as a fire-control measure to allow for optimal control of prescribed fire within the meadows.

Indicator 1: Proximity of tree removal activities to stream channels.

Although this project involves only hand treatment of conifers, removing trees along stream channels could result in instability and ground disturbance along channel banks. The resource protection measures for this project include restrictions to avoid this impact, such as leaving downed trees and large woody debris that exist in perennial and intermittent channels in place, using directional falling to keep removed trees out of perennial and intermittent channels, and restricting tree removal activities within 5 feet of perennial and intermittent channels unless approved by a watershed specialist.

Implementation of these resource protections measures is expected to avoid impacts to stream channels from tree removal activities.

Indicator 2: Concentrated crew activity in sensitive soil areas

Tree removal activities by hand crews are by design a low impact activity. This type of treatment technique minimizes ground disturbance by limiting soil compaction and reducing the need to drag material over the ground. Because of the low impacts associated with hand crew tree removal activities, ground disturbance resulting from project treatments in general meadow areas and buffers are not expected.

Nonetheless, perennially wet areas such as fens can be prone to impacts from even this low impact activity. Fens are known to exist in Baldwin, Freel, Hell Hole, and Meiss Meadow. For this reason, fens will be identified in the field prior to tree removal activities and ground disturbing activities such as tree stump removal, material removal (i.e. soil, rock, gravel, wood), soil excavation and staging equipment and materials will be excluded from fens. In addition, foot traffic will be limited in these areas and felled trees will not be dragged through fens.

With implementation of these resource protection measures in fens, and because hand tree removal activities are very low impact treatments in general, impacts to sensitive soil areas from tree removal activities are not expected to result from this project.

Prescribed Burning

Prescribed fire in the form of broadcast burning and pile burning is proposed with this project. Prescribed fire will be used primarily to remove small conifers and to enhance native riparian plant vigor and diversity.

Indicator 1: Construction of fire lines

Existing roads and trails would be utilized as fire lines to minimize new ground disturbance, although additional fire lines may need to be constructed with hand tools within limited portions of project SEZs. Any needed fire lines within meadows would primarily be wet-line construction

(using water to saturate the ground rather than physically constructing a line of bare soil); hard fire line would be minimized. All constructed fire lines would be rehabilitated after implementation following Region 5 Best Management Practices (BMPs) (Appendix A). Rehabilitation activities may include using hand crews and hand tools to rake the berms back into the depression, installing water bars to prevent concentrated flow paths, and scattering downed wood to provide surface roughness. Appropriate construction and decommissioning techniques will be determined for fire lines in meadow areas through consultation with a watershed specialist to minimize disturbance to ground cover and riparian vegetation. Fire line construction will be excluded from sensitive soil areas, such as fens.

Fire lines will be in place for only a short period of time prior to rehabilitation after the broadcast burns, nonetheless some short term surface drainage effects could result from fire line construction. However, since construction would be limited in meadow areas and excluded from fens, and full rehabilitation is planned for fire lines used for this project, long term or permanent impacts to soil and hydrology resources are not expected to result from fire line construction for this project.

Indicator 2: Proximity of piles to stream channels

Piles in close proximity to stream channels could contribute to surface water quality impacts from the transport of ash and debris to streams. For this reason, piles will be placed further than 25 ft from the edge of stream channels to prevent water quality impacts resulting from burned material or ash being transported to channels. In the past, the 1988 LTBMU Forest Plan restricted piles to areas at least 50 ft from stream channels; however, the 2014 Lahontan Timber Waiver extends the piling area to within 25 ft of channels. Because the 25 ft buffer is consistent with the permits for this project, this narrower buffer will be used for this project. Due to inconsistencies with existing Forest Plan restrictions, a Forest Plan Amendment is proposed for this project. The Forest Plan Amendment would have no effects to hydrology or soils because project specific resource protection measures would be adequate to protect those resources and the timber waiver process would be followed.

In addition, pile density will be limited within SEZs to prevent scorched ground surface conditions over a large portion of the landscape near stream channels. The footprint of piles burned in a given year will also be limited within SEZs, and pile construction will be limited in fens. Bare soil areas left in meadow areas are expected to recover quickly due to the wetter conditions allowing vegetation to re-establish. Piles will be concentrated on meadow boundaries when feasible to prevent large concentrations of piles on the meadow surface.

Implementation of the project resource protections measures, including limitations on pile density and location related to pile burning will avoid impacts to soil and water quality from these project activities.

Indicator 3: Intensity of broadcast burning

High intensity fire has the potential to damage sensitive soil areas and result in water quality impacts. High intensity fire can result in hydrophobicity (or water repellency) of soils, possibly leading to increased runoff and erosion. Fire intensity for this project would be low to moderate and duration would be limited to reduce resource damages associated with high intensity fires. Tree removal activities and pile burning are proposed in meadows and buffers where fuel loading is high and low to moderate intensity broadcast burning is not feasible under the existing conditions. Broadcast burning prescriptions would be designed to ensure that fire intensity and duration do not result in severely burned soils. Flame heights would not exceed 2 feet within 25 feet of stream channels or on wetlands unless higher intensities are required to achieve specific

objectives. No ignitions will take place within 25 feet of perennial and intermittent channels; however fire will be allowed to back into these areas. Fire ignition is prohibited within fens. Any resulting hydrophobicity will be limited in extent, and due to the wet conditions in project area meadows will not persist on the landscape.

Pre-treating areas with high fuel loading through tree removal activities and using pile burning in place of broadcast burning where fuel loading is high will avoid conditions that would result in high intensity fire. This in addition to the flame height and ignition restrictions will prevent impacts to sensitive soil areas and water quality resulting from broadcast burning. No effects from the Forest Plan Amendment are expected because project specific resource protection measures would be adequate to protect soil resources.

Head cut Repair

Indicator 1: Method of head cut repair

Head cut repair is proposed in Benwood, Freel, Meiss, and Star meadows. Several minor head cuts are known to exist on channels within Benwood and Freel meadows. A minor head cut has also been identified in Star Meadow. Some or all of these head cuts would be repaired with this project by stabilizing the head cuts in their existing location, and preventing them from getting deeper or propagating further upstream. Although head cuts are not known to exist in Meiss Meadows, there is potential that head cuts are present in this area, and if so they would be repaired with this project. The head cut in Star meadow is from a spring/seep, as there are no perennial channels in the meadow.

Head cut repair in each of these meadows would be focused on perennial and intermittent channels, and the spring in Star Meadow. For this reason, it is likely that the channels will be flowing during in-channel activities. In order to avoid diverting flows, any head cuts identified on perennial channels or flowing intermittent channels will not involve excavation or earth movement; actions will focus on strategic placement of onsite material. In order to avoid adverse water quality impacts, loose dirt and other debris will be cleared from rocks and logs before placing them into channels at head cuts. In addition, soil movement will be avoided during head cut repair, and any exposed soil resulting from repairing head cuts will be covered with rock, logs, or branches, or will be planted with native vegetative material (e.g. willow stakes placed approximately every one foot).

The channels proposed for head cut repair are small headwater streams, with low base flow conditions. Some limited in-channel bed and bank disturbance will result from repair activities. However, these will be limited as described above and in the resource protection measures described in Chapter 2. Because of the low flow conditions and limited bed and bank disturbance proposed, impacts to water quality would be minor, and limited in duration. Minor, short term violations of the water quality standard for Tahoe related to turbidity are likely to result from head cut repairs that occur on flowing channels. For this reason, project specific Waste Discharge Prohibition Exemptions will be sought for project implementation prior to this work being conducted.

Indicator 2: Condition of stream channel prior to head cut repair

Head cuts are a sign of channel instability and are usually associated with eroding banks and channel beds. The purpose of head cut repair activities associated with this project are to stabilize the head cuts that exist in project area meadows to prevent further meadow drying and protect water quality. If head cuts are not repaired or stabilized, they typically migrate slowly upstream and could continue to deepen, drying out more of the meadow as they move. The head cuts being

repaired with this project are relatively small in size, such that they can be repaired by hand crews using on-site rock, log material, willows, or other vegetative materials. Larger head cuts (more than approximately 2 feet high) will not be repaired with this project.

This project will stabilize head cuts in the specific meadows listed above, reducing bank and bed erosion and improving water quality downstream. Any short term water quality impacts associated with placement of rock and log/slash materials in the channels at head cuts will be very minor with implementation of the resource protection measures described in Chapter 2, and the long term result of head cut repair activities will be improved water quality conditions.

Re-establishment of Meiss Corral

Indicator 1: Concentration of soil compaction

Once the corral is re-established, it is possible that pack animals visiting the area would use it for daytime or overnight stays. This concentrated use by large pack animals could result in increased soil compaction within the corral and possibly hinder the growth and persistence of meadow vegetation. The corral occupies approximately 0.1 acre of the meadow and is 35 ft from the nearest perennial channel. Due to the small footprint of the corral, limited use by visiting pack animals, and the distance of the corral from the stream, it is not anticipated that soil compaction from re-establishment of the Meiss Corral will result in soil or hydrology impacts.

Indicator 2: Accumulation of animal urine and feces

Wherever there is concentrated use by pack animals, there is potential for accumulation of urine and animal feces. During rain and snowmelt conditions, this material could be carried with runoff from the corral to surface waters in the vicinity, contributing to water quality impacts. Due to the small footprint of the corral, limited use by only visiting pack animals, and the distance of the corral from the stream, it is not anticipated that re-establishment of the Meiss Corral will result in water quality impacts that would violate Lake Tahoe Basin standards.

Re-routing trails

Indicator 1: Length of trail improved

Two segments of the Pacific Crest Trail through Meiss Meadow are adversely affecting meadow hydrology and need repair. The trail segments being re-routed total approximately 1.1 mile in length. The new trail segment will be located on high capability land further away from the channel adjacent to the meadow's edge. The 1.1 mile length of existing trail will be decommissioned and restored to a condition that will no longer impede meadow hydrology. The new trail segment will meet current trail BMP standards and therefore is not expected to result in drainage or water quality impacts.

Use of livestock to transport materials to support prescribed fire activities

Because of the remote location of many of the project area meadows and the limitation of hand crews to carry large amounts of equipment and supplies for this distance, livestock may be used to transport materials associated with prescribed fire activities.

Indicator 1: Animals stay in sensitive areas.

Pack animals are currently allowed in the project area meadows. Existing restrictions to animals in these forest areas will be followed during project implementation. Overnight stays of livestock are not expected for this project. Livestock will be prohibited from fens. Given the limited duration and extent of livestock use in project area meadows, impacts to soil and water quality are not expected to result from livestock use for this project.

Indicator 2: How material will be transported on animals.

The majority of the animal traffic for this project will be concentrated on existing trails. All materials would be fully suspended on the back of the animals using existing trails. Therefore, animal tracks are the only ground disturbance expected associated with this project, and that disturbance will be concentrated in existing disturbed areas on trails. Impacts to soil quality are not expected to result from these activities.

Indicator 3: Streambank disturbance resulting from livestock.

Streambank disturbance from livestock will be limited to less than 10% of any stream reach within the project area. This limited streambank disturbance will not impact stream condition or water quality conditions in project area streams.

Cumulative Effects

As demonstrated in Figure 1-1, the acres proposed for treatment under this project are distributed across the south shore of the Lake Tahoe Basin and amount to a very small number of total treatment acres in each watershed. Specifically, the proportion of total watershed acres that will be affected by proposed project activities is very small (Figure 3-7). In addition, there is no way to accurately predict the treatment year for any of the proposed treatments, making it impossible to effectively perform a traditional cumulative watershed effects (CWE) analysis.

Although significant direct and indirect impacts will be prevented through BMP implementation and project resource protection measures, there will be some decrease in overall soil cover and in some cases infiltration capacity from increased hydrophobicity in the treatment areas as a result of the proposed prescribed burning. However, vegetation recovery is quick in wetter, riparian areas and hydrophobicity is lessened in wet soil conditions, so these effects are not expected to persist. The cumulative effect on the watershed response to peak runoff is not expected to be significant because of the localized nature of these impacts (i.e. very small overall acreage per watershed). In addition, the potential increase in peak runoff would likely be less than the normal annual variation, and thus would not likely be detectable.

The proposed treatments, with the proper implementation of resource protection measures and applicable BMPs, are expected to result in little to no increase in erosion or negative impacts to soil and water resources in the area.

The cumulative effects of the proposed project activities are the improvement of meadow conditions in project area meadows by arresting the drying trend occurring now through head cut repair/stabilization and conifer removal. The other projects considered for cumulative effects are expected to have positive results with regards to watershed health, and are primarily located outside of the actual treatment areas of this project. In the case of Baldwin Meadow, where other fuel reduction projects may treat the same ground as this project, the low impact treatment techniques proposed with the Restoration of Fire Adapted Ecosystems project will still not lead to significant cumulative effects on soil or hydrologic resources. Ground disturbing activities for other project treatments (e.g. South Shore Fuel Reduction Project and Aspen Restoration Project) require specific soil moisture conditions for mechanical treatments in order to protect wet soil areas from increased soil compaction and erosion. As described above, the treatments proposed for this project are very low impact, involving only hand thinning and prescribed burning.

The cumulative effects of these projects and the proposed treatments will be improved water quality due to decreased sediment input from unstable streams, in combination with improved

road and trail conditions in the project watersheds. This project's treatments in conjunction with other meadow restoration activities completed and proposed in the project watersheds will improve meadow health and water storage capacity at higher elevations.

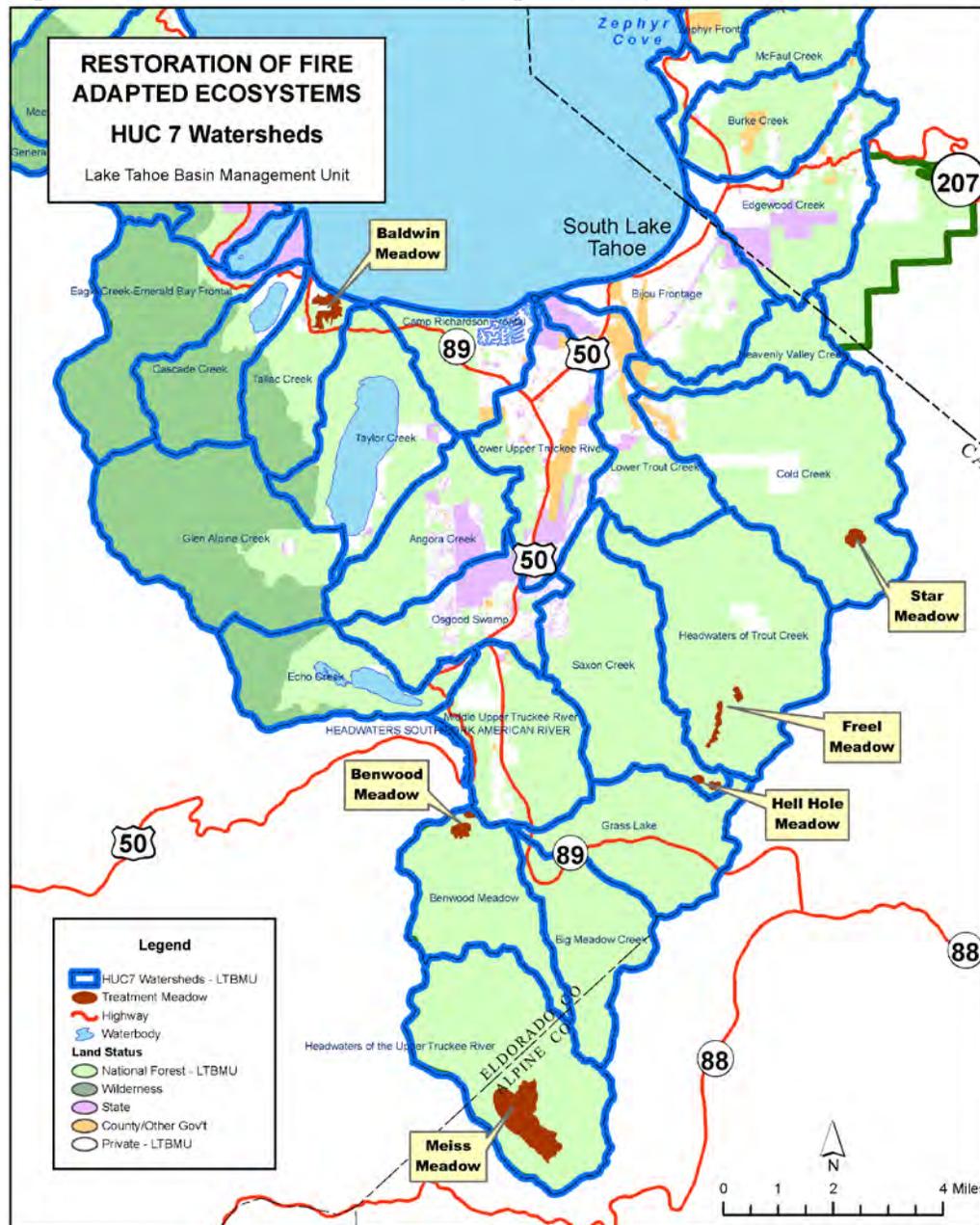


Figure 3-7: Hydrologic Unit Code (HUC) 7 watersheds in the project area.

Analytical Conclusions

The No Action alternative will not result in conifer removal from meadows in the project area, or head cut repair. Conifer encroachment and head cut propagation will continue to negatively affect meadow conditions, leading to continued meadow drying and possibly continued water quality effects from channel bed and bank erosion.

Implementation of the project resource protections measures is expected to avoid impacts to stream channels from tree removal activities.

Because fire lines will be in place for only a short period of time prior to rehabilitation after the broadcast burns, construction would be limited in meadow areas and excluded from fens, and full rehabilitation is planned for fire lines used for this project, long term or permanent impacts to soil and hydrology resources are not expected to result from fire line construction for this project.

Implementation of the project resource protections measures related to pile burning will avoid impacts to soil and water quality from these project activities.

Pre-treating areas with high fuel loading through tree removal activities and using pile burning in place of broadcast burning where fuel loading is high will avoid conditions that would result in high intensity fire and prevent impacts to soil resources and water quality resulting from broadcast burning.

This project will stabilize head cuts in the specific meadows listed above, reducing bank and bed erosion and improving water quality downstream. Any short term water quality impacts associated with placement of rock and log/slash materials in the channels at head cuts will be very minor with implementation of the resource protection measures described above, and the long term result of head cut repair activities will be improved water quality conditions.

Due to the small footprint of the Meiss Corral, limited use by only visiting pack animals, and the distance of the corral from the stream, it is not anticipated that re-establishment of the Meiss Corral will result in soil or water quality impacts.

The 1.1 miles segments of existing Pacific Crest Trail will be decommissioned and restored to a condition that will no longer impede meadow hydrology. The new trail segment will meet current trail BMP standards and therefore is not expected to result in drainage or water quality impacts.

Given the limited duration and extent of livestock use in project area meadows, impacts to soil and water quality are not expected to result from livestock use for this project. Streambank disturbance from livestock will be limited to less than 10% of any stream reach within the project area.

Invasive Plants

Introduction

In 2003, the Chief of the U.S. Forest Service identified invasive species—including terrestrial invasive plants—as one of four critical threats to the National Forest System (NFS) (Bosworth 2003). Invasive plants pose a serious threat to ecosystem function because of their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). Invasive plants can also greatly reduce the recreational and aesthetic values of forestlands.

Many of the activities managed by the Forest Service have the potential to introduce or spread invasive plants. Both national and regional Forest Service management direction prioritize prevention of invasive plant introduction and spread on NFS lands by considering invasion risks during project planning and—to the extent feasible—incorporating invasive plant prevention measures into all activities (EO 13112, USDA 2000, USDA 2011). In the Sierra Nevada, the Sierra Nevada Forest Plan Amendment directs national forests to conduct invasive plant risk assessments during project planning (USDA Forest Service 2004). For additional information, refer to the project’s Invasive Plant Species Risk Assessment report located in the project record.

Methodology

Potential effects from invasive plants are presented in the context of the risk of introduction and spread associated with proposed activities, rather than effects to specific resources; these resource-specific effects are addressed in other resource sections, as appropriate. On the LTBMU, an established invasive plant risk assessment process has been used to evaluate projects involving ground-disturbance activities since 2004—when the Sierra Nevada Forest Plan Amendment required National Forests in the Sierra to conduct such assessments (USDA Forest Service 2004).

On the LTBMU, invasive plant risk is assessed by examining both non-project-dependent factors (inventory, known infestations, vectors not-dependent on proposed action; habitat vulnerability) and project-dependent factors (vectors expected to result from proposed action; and habitat alteration expected to result from proposed action). The list of invasive plants of management concern on LTBMU as well as a detailed assessment of invasive plant risks associated with the project can be found in the project’s invasive plant risk assessment. To assess potential invasive plant vectors and seed sources, the analysis area includes the project area and a 1-mile buffer.

Overview of the Affected Environment

Survey & Inventory (known infestations)

The entire project area was surveyed for invasive plants in 2010-2013. As such, survey and existing inventory are sufficient to complete the risk assessment.

The only meadow in the project area that contains known invasive plant infestations is Baldwin Meadow. In the five other meadows that constitute the project area, there are no invasive plant infestations.

Table 3-12. Invasive plant infestations in Baldwin Meadow

Species	Number of infestations	Acres
<i>Cirsium arvense</i> (Canada thistle)	1	0.04
<i>Cirsium vulgare</i> (bull thistle)	11	2.49
<i>Leucanthemum vulgare</i> (oxeye daisy)	2	0.10
TOTAL	14	2.63

Habitat Vulnerability

The project area is dominated by conifer forests and montane meadows, with little disturbed habitat, except at Baldwin Meadow, where intensive and extensive current recreation and infrastructure as well as a moderate degree of former grazing have resulted in a highly altered and disturbed meadow complex. Whether they originate from human causes (e.g. road construction, thinning) or natural causes (e.g. wildfire, windfall), disturbed habitats often have a higher susceptibility to invasions than those with long periods in late successional phases (Radosевич 2002). As such, Baldwin Meadow is highly vulnerable to invasion, while the remaining five meadows exhibit low vulnerability.

Non-project dependent vectors

Invasive plant introduction occurs when plant propagules are moved from one infestation—the “seed source”—to new and often uninvaded habitat. In general, any activity that moves soil or plant parts—especially seeds—from one location to another has the potential as a vector for invasion (Radosевич 2002). Non-project vectors include natural processes (i.e. stream flow, wildlife movement) as well as anthropogenic vectors, including vehicle traffic, utility corridors, recreationists, stock movement, urban development (i.e. escape from horticultural plantings), and use of imported infested materials (e.g. gravel, fill, straw, seed).

Access routes—whether they are major highways, general forest roads, motorized vehicle trails, non-motorized trails, or utility corridors—are often the primary conduit for introduction and establishment of invasive plants because they allow for easier movement by wild or human vectors (e.g. on clothes, shoes, hooves, and tires). The access route density in the analysis area is characterized as low, except at Baldwin Meadow. The project area does experience a moderate level of dispersed recreation in the form of hiking, skiing, and scenery/wildlife viewing at five meadows and a high level at Baldwin Meadow. The project area is not used for grazing or subject to substantial stock movement. In total, the project area has a relatively low risk from non-project vectors.

Environmental Consequences

Habitat Alteration Expected As A Result of Proposed Action

There will be ground disturbance, creation of disturbed areas, and change in plant species composition resulting from the proposed conifer removal, prescribed fire, head cut repair, and trail reroute activities. However, compared to other management activities on the LTBMU, the habitat alteration is expected to be relatively low. The project does not utilize heavy equipment, which usually contributes substantially to ground disturbance. Fire intensity is expected to be low to moderate. Creation of disturbed areas is limited to construction of hand fireline and ~1.1 miles of trail reroute. Changes in plant species composition are expected to be primarily from native conifer to native meadow vegetation. In total, the proposed activities present a low risk of habitat alteration.

Increased Vectors As A Result of Proposed Action

The project does not substantially increase access routes, recreation facilities, utility corridors, livestock grazing, or movement of water from potentially invaded sources. The use of imported equipment or materials is not anticipated, as revegetation materials will be cultivated on-site and all conifer removal, head cut repair, and trail reroute activities will be conducted with hand tools.

The use of pack stock to transport tools for conifer removal and prescribed burn activities represents the highest potential of invasion associated with the proposed activities. Invasive plant parts (i.e. seeds, reproductive vegetative material) can be transported on the hooves of livestock. On the LTBMU, pack stock are sometimes imported from lower elevations (e.g. Sacramento Valley, Minden-Gardnerville area). In California, invasive plant species richness is generally greater at lower elevations, increasing the risk of new introductions as vectors move from low to high elevations (Dark 2004; Randall et. al. 1998). In Alpine County, the livestock movement from lower to higher elevations is considered a primary vector for the spread of medusahead (*Elymus caput-medusae*).

At Baldwin Meadow, there is potential to stage equipment and staff in infested areas or conduct proposed activities in infestations, which could result in spread of invasive plants to nearby uninfested areas. However, infestations would be flagged and treated prior to implementation as well as avoided as staging areas and during proposed activities, in accordance with the project's resource protection measures.

The proposed activities present a low risk of increasing vectors for invasive plant introduction and spread.

Management Measures

Standard invasive plant management measures as well as project-specific measures—such as designating control areas and treatment of infestations prior to implementation—have been included to minimize risk of new introductions and minimize the spread of invasive plants to the project. These measures are detailed in Chapter 2. They are consistent with Forest Service policy and manual direction and the LTBMU LRMP as amended by the SNFPA. The invasive plant management measures are sufficient to reduce the risk of invasive plant introduction and spread. If the management measures are not implemented, then the invasive plant risk would be higher, but not substantially.

Analytical Conclusions

Overall, the anticipated invasive plant response to the project is low. There is a low risk from non-project vectors and known infestations and the habitat vulnerability is relatively low at all but Baldwin Meadow. The proposed activities represent a low risk of introduction or spread and habitat alteration is expected to be minimal.

Management Indicator Species

Introduction

Management Indicator Species (MIS) are animal species identified in the Sierra Nevada Forests Management Indicator Species (SNF MIS) Amendment Record of Decision (ROD) signed December 14, 2007, which was developed under the 1982 National Forest System Land and Resource Management Planning Rule (1982 Planning Rule) (36 CFR 219). Guidance regarding MIS set forth in the Lake Tahoe Basin Management Unit LRMP as amended by the 2007 SNF MIS Amendment ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS, as identified in the Lake Tahoe Basin Management Unit LRMP as amended. For additional information, refer to the project's MIS report located in the project record.

Methodology

Management Indicator Species for the Lake Tahoe Basin Management Unit are identified in the 2007 Sierra Nevada Forests Management Indicator Species Amendment (USDA Forest Service 2007). The habitats and ecosystem components and associated MIS analyzed for the project were selected from this list of MIS, as indicated in Table 3-13. In addition to identifying the habitat or ecosystem components (1st column), the CWHR type(s) defining each habitat/ecosystem component (2nd column), and the associated MIS (3rd column), the Table discloses whether or not the habitat of the MIS is potentially affected by the Restoration of Fire Adapted Meadows Project (4th column).

The analysis of the effects of the Restoration of Fire Adapted Ecosystems Project on the MIS habitat for the selected project-level MIS is conducted at the project scale for all habitat types except for Snags in Green Forest. For the purposes of analyzing the Snags in Green Forest ecosystem component the analysis area utilized in this project's terrestrial wildlife biological evaluation (BE) was used, because of data availability. A description of the analysis area can be found in the BE for Terrestrial Wildlife Species (Project Record). The most recent snag data available for use in this analysis comes from the LTBMU project South Shore Fuel Reduction and Healthy Forest Restoration (South Shore Fuels). Many of the South Shore Fuels stands are within the analysis area but not within this projects action area.

The analysis used the following habitat data: existing vegetation GIS layer (Lake Tahoe Basin Existing Vegetation; 2005). Detailed information on the MIS is documented in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010), which is hereby incorporated by reference.

Cumulative effects at the bioregional scale are tracked via the SNF MIS Bioregional monitoring, and detailed in the 2010 SNF Bioregional MIS Report (USDA Forest Service 2010).

Information regarding the analysis area and projects and other activities within the analysis area that are relevant to the proposed project can be found in the Restoration of Fire Adapted Ecosystems Project Biological Assessment/Biological Evaluation (Project Record).

Table 3-13. Selection of MIS for Project-Level Habitat Analysis for the Restoration of Fire Adapted Meadows Project.

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component ¹	Sierra Nevada Forests Management Indicator Species <i>Scientific Name</i>	Category for Project Analysis ²
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	2
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler <i>Dendroica petechia</i>	3
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree (chorus) frog <i>Pseudacris regilla</i>	3
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail <i>Oreortyx pictus</i>	1
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail <i>Oreortyx pictus</i>	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse <i>Dendragapus obscurus</i>	1
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl <i>Strix occidentalis occidentalis</i>	1
		Pacific marten <i>Martes caurina</i>	
		northern flying squirrel <i>Glaucomys sabrinus</i>	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker <i>Picoides villosus</i>	3

¹ All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

² **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.

Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.

Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

Overview of the Affected Environment

Habitat conditions (and available habitat types) in the wildlife analysis area for MIS habitat were quantified using the California Wildlife Habitats Relationships v.8.1 (CWHR) personal computer program developed by the California Department of Fish and Wildlife (CDFW; formerly Fish and Game) (CDFW 2005). Geographic information system (GIS) data for CWHR come from the Existing Vegetation (Eveg) GIS layer

(<http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/>). The CWHR program describes vegetation conditions through metrics such as tree size classes and canopy closure and functions as a predictive model of habitat suitability for wildlife species. CWHR ranks habitat suitability for each vegetation type as 0.0 (not suitable), 0.33 (low), 0.66 (moderate), or 1.0 (highly suitable) for each wildlife species. CWHR canopy closure classification system defines “open” canopy as S (10-24% canopy closure) and P (25-39% canopy closure), and “closed” canopy as M (40-59% canopy closure) and D (>60% canopy closure). Tree size classes are defined as: 1 (Seedling <1" diameter-at-breast height [dbh]); 2 (Sapling 1"-5.9" dbh); 3 (Pole 6"-10.9" dbh); 4 (Small tree 11"-23.9" dbh); 5 (Medium/Large tree >24" dbh); 6 (Multi-layered Tree) (Mayer and Laudenslayer 1988).

There are approximately 62 acres of montane riparian habitat and no acres of valley foothill riparian habitat in the action areas of this project with a mean shrub canopy cover of 67%. The LTBMU existing vegetation GIS layer does not include data for an overstory tree component in the MRI habitat in the action areas and therefore there is no overstory canopy cover and no size class data to discuss.

There are 314 acres of wet meadow habitat in the action areas. All of these acres contain herbaceous plants and herbaceous ground cover but the LTBMU existing vegetation data does not include height classes or cover classes for this habitat type. All of the project meadows are in an impaired hydrological state due to conifer encroachment, past grazing activities, in-channel head cuts and poorly located trail segments.

There are approximately 147 acres of mid seral coniferous forest habitat, as it is described in Table 1, within the action areas of this project. The majority of this habitat has 40-59% canopy closure (40-59% = 127.6 acres, 25-39% = 19.1 acres, 10-24% = 0.3 acres). The amount of shrub cover in this area is undefined in the LTBMU existing vegetation GIS layer, however, it is reasonable to assume that shrubs are evenly distributed in a random mosaic throughout the habitat.

There are a total of 54,802 acres of green forest habitat in the analysis area that are size class 4 (11-23.9" DBH) or 5 (≥ 24 " DBH). There are 510 acres of green forest habitat in the project action areas that are size class 4 or 5. There are no data available for this project or a geographically overlapping project that specifically classifies the number of snags 11-23.9 inches DBH and greater than 24 inches DBH. Stand exam data was collected in 2008 for a subset of stands from the South Shore Fuel Reduction and Healthy Forest Restoration project (South Shore Fuels). These stands are within the analysis area of this project but do not overlap the project action areas. These data do not specify the size of the snags. The number of snags/acre was assessed for 201 of the 315 South Shore Fuels units. The average number of snags/acre was 21

(Standard Deviation = 36) with a range from zero to 324. Using an average of 21 snags/acre it can be estimated that the green forest in the analysis area (54,802 acres) has 1,150,842 snags. However, this most likely overestimates the number of snags because the South Shore Fuels project focused on forested areas near urban areas and the wildland urban interface (WUI), which likely has more snags/acre than the project action areas, because the project action areas includes habitat that is traditionally composed of herbaceous cover rather than overstory cover (e.g. meadow).

Environmental Consequences

Early seral coniferous forest (mountain quail), late seral open canopy coniferous forest (sooty grouse) and late seral closed canopy coniferous forest (California spotted owl, Pacific marten and northern flying squirrel) habitats as they are described in Table 3-6 do not exist in the action areas of this project and therefore will not be carried forward in this analysis. There are 7.9 acres of Riverine and Lacustrine habitat in the action areas of this project (Baldwin Meadow = 1.7 acres, Benwood Meadow = 4 acres, Meiss Meadow = 0.8 acres, Hellhole = 1.3 acres): consisting entirely of lacustrine habitat and no riverine habitat. None of the project actions involve alterations to lacustrine habitat. The Riverine and Lacustrine habitat type as it is described in Table 3-6 will not be affected by this project; therefore this habitat type will not be carried forward in this analysis. The MIS selected for project-level MIS analysis for the Restoration of Fire Adapted Meadows Project are: Riparian, Wet Meadow, Mid Seral Coniferous Forest and Snags in Green Forest.

Riparian Habitat (Yellow Warbler)

Direct and Indirect

Alternative 1 (No Action)

The No Action alternative would avoid effects to riparian habitat, but would also forgo the opportunity to bring the fire return interval towards NRV, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Alternative 2 (Proposed Action)

The proposed action would not reduce the amount of riparian habitat. In action areas where willow are planted (Baldwin Meadow, Benwood Meadow, Freel Meadow and Hellhole) the amount of riparian habitat could be increased by as much as 23 acres. The deciduous canopy cover could be reduced in the short term due to broadcast burning. However, it is likely that the majority of the deciduous shrub cover will not burn due to the amount of groundwater. If deciduous shrubs do burn, they will likely resprout since willows are adapted to sprouting after disturbance. Willow planting will also increase the amount of deciduous shrub cover in MRI habitat.

Cumulative

Alternative 1 (No Action)

There will be no cumulative effect to the Riparian habitat type as a result of Alternative 1 of this project.

Alternative 2 (Proposed Action)

There should be no negative cumulative effect to riparian habitat type as a result of Alternative 2. There could be up to 23 acres added to this habitat type and existing habitat canopy cover could be increased as a result of this project.

Wet Meadow Habitat (Pacific Tree (chorus) Frog)*Direct and Indirect*Alternative 1 (No Action)

The no action alternative would avoid effects to wet meadow habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Alternative 2 (Proposed Action)

The proposed action would remove conifer trees from approximately 228 acres of project meadows. After removing conifers all of the action areas except Hellhole would be broadcast burned and/or pile burned (pile burning may occur at Hellhole). This could remove a large portion of the herbaceous plants for the remainder of that growing season. However, the herbaceous layer should return the next growing season with more diversity and vigor. Removing conifer, broadcast burning, pile burning and repairing head cuts should raise the water table and therefore improve meadow hydrology.

*Cumulative*Alternative 1 (No Action)

There will be no cumulative effect to the wet meadow habitat type as a result of Alternative 1 of this project.

Alternative 2 (Proposed Action)

There should be no cumulative effect to the wet meadow habitat type as a result of Alternative 2. There could be up to 228 acres added to this habitat type.

Mid Seral Coniferous Forest Habitat (Mountain Quail)*Direct and Indirect*Alternative 1 (No Action)

The no action alternative would avoid effects to mid seral coniferous forest habitat, but would also forgo the opportunity to bring the fire return interval towards NRV, and improve resiliency.

Alternative 2 (Proposed Action)

Of the 147 acres of mid seral coniferous forest habitat in the action areas, 142 acres are in the conifer thinning areas. In the conifer thinning areas, trees less than 18” would be thinned. The amount of thinning would depend on the current stand structure. Therefore, it is possible that all of this habitat type as it is described in Table 3-6 could be removed. However, it is more likely that some of this habitat type contains trees that are larger than 18” (CWHR size class 4 includes trees from 11-24” diameter at breast height (DBH)) and therefore would be retained. Removal of a majority of this habitat would likely reduce canopy cover but the total reduction would depend on the current stand structure.

*Cumulative*Alternative 1 (No Action)

There will be no cumulative effect to the mid seral coniferous forest habitat type as a result of Alternative 1 of this project.

Alternative 2 (Proposed Action)

There will be no cumulative effect to the mid seral coniferous forest habitat type as a result of Alternative 2 of this project, because there is still going to be plenty of mid seral coniferous forest left in the LTBMU and therefore there will not be a catastrophic consequence.

Snags in Green Forest Ecosystem Component (Hairy Woodpecker)

Direct and Indirect

Alternative 1 (No Action)

The no action alternative would avoid effects to snags in green forest habitat, but would also forgo the opportunity to bring the fire return interval towards NRV, and reduce the density of conifer encroachment both of which could increase snag density.

Alternative 2 (Proposed Action)

There are a total of 54,802 acres of green forest habitat in the analysis area that are size class 4 (11-23.9" DBH) or 5 (≥ 24 " DBH). There are 510 acres of green forest habitat in the project action areas that are size class 4 or 5. Cutting of snags is not included in the proposed action. However, the proposed action may increase the number of snags in the action areas. In the process of removing conifer from the meadows, thinning conifer in the buffer areas, and prescribed fire activities, some snags may be recruited (purposefully or opportunistically), or may be damaged leading to future recruitment.

Cumulative

Alternative 1 (No Action)

There will be no cumulative effect to the snags in green forest habitat type as a result of Alternative 1 of this project.

Alternative 2 (Proposed Action)

The change in the number of medium snags per acre on up to 510 acres will not alter the existing trend in the snags in green forest habitat type.

Analytical Conclusions

The short-term reduction and long-term increase in acres and deciduous canopy closure of 62 acres out of a total of 38,140 acres of riparian habitat on National Forest System lands in the Sierra Nevada will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of yellow warblers across the Sierra Nevada bioregion.

The increase in wet meadow habitat, increase in diversity and vigor of the herbaceous layer and raising of the meadow hydrology on 639 acres of wet meadow habitat in the Restoration of Fire Adapted Ecosystems Project area will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of Pacific tree frogs across the Sierra Nevada bioregion but it will add a small amount of habitat and improve existing habitat.

The possible reduction of approximately 142 acres of mid seral coniferous forest habitat, as it is defined in Table 3-13, out of 2,776,022 acres of mid seral coniferous forest habitat on National Forest System lands in the Sierra Nevada will not alter the existing trend in the habitat, nor will it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

The change in medium-sized snags/acre on 510 acres will not alter the existing trend in the ecosystem component, nor will it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

For all habitat types and ecosystem components analyzed for this project, except Mid Seral Coniferous Forest, Alternative 2 would have more benefit than Alternative 1. A very small amount of Mid Seral Coniferous Forest could potentially be lost due to Alternative 2. However the gain in the other habitat types is a greater benefit to MIS species as a whole than the loss of Mid Seral habitat is detrimental.

Recreation

Introduction

The US Forest Service (USFS), Lake Tahoe Basin Management Unit (LTBMU) manages 75 percent of lands within the Lake Tahoe Basin. Management of LTBMU lands in the study area is guided by the LTBMU Forest Plan (USDA Forest Service 1988). Specific standards and guidelines for recreation resources are also described in the *Sierra Nevada Forest Plan Amendment* (USDA Forest Service 2004) and Record of Decision, which adopts an integrated strategy for vegetation management, aimed largely at reducing the risk of wildfire. As it pertains to recreation, the *Sierra Nevada Forest Plan Amendment* clarifies how several of the riparian standards apply to recreation activities, uses, and projects, and gives local managers the opportunity to develop mitigation measures for small and varied recreation projects on a project- and site-specific basis.

The Restoration of Fire Adapted Ecosystems project is the analysis area used for the analysis of the existing recreation conditions and the effects of the action alternatives. Indicators of effects are linked to the types of activities that would occur with implementation of the project. Often effects to the recreation resource are analyzed in terms of changes to access to the recreation opportunities provided in the area, as well as changes to the quality of recreation activity (which can include changes to scenery, alterations to the type of activity allowed, risk for recreation opportunities to be lost due to wildfire; effects from the creation of unauthorized travel routes; restrictions or closures on areas, trails, and roads; traffic congestion, etc). In addition to analyzing changes to access and high quality recreation opportunity, the Forest Service evaluates possible impacts to the Recreation Opportunity Spectrum (ROS), as well as compliance with accessibility guidelines and the Forest Service Built Environment Image Guide (BEIG).

The Recreation Opportunity Spectrum system is a means of classifying recreation experiences by the kind of facilities and degree of contact with visitors (FSM 2330.3). The system is used to assign a variety of existing and potential recreation activities and opportunities to national forest system lands. The LTBMU 1988 Forest Plan displays the current mix of ROS classes (USDA Forest Service 1988).

The Forest Service Built Environment Image Guide informs changes within the built environment (FSM 7310). The built environment refers to the administrative and recreation buildings, landscape structures, site furnishings, structures on roads and trails, and signs installed or operated by the Forest Service, its cooperators, and permittees. The elements of the built environment constructed on national forest lands and grasslands – to the extent practicable – incorporate the principles of sustainability, reflect their place within the natural and cultural landscape, and provide optimal service to our customers and cooperators.

Accessibility on NFS lands is incorporated through universal design principles. Using universal design principles is Forest Service policy, as stated in Forest Service Manual (FSM 2330.3). The Architectural Barriers Act (ABA) became law in 1968. The act mandates that all facilities designed, built, altered, bought, rented, or leased by, for, or on behalf of a Federal agency must be accessible. The Forest Service Outdoor Accessibility Guidelines (FSORAG) and Forest Service Trail Accessibility Guidelines (FSTAG) must be used for the design, construction, alteration, purchase, or replacement of recreation sites, facilities, constructed features, and trails that meet FSTAG requirements on the National Forest System (FSM 2330 and FSM 2350).

Some existing recreation use generates resource management and environmental concerns within the project area, as detailed in the following paragraphs.

Unauthorized Trails

A well designed trail system provides for a range of recreation experiences and challenges, provides a means for users to get from one place to another, and minimizes resource impacts and maintenance requirements. Occasionally, trail users take “short cuts” from one trail to another, or try to create their own, new trail. Such user created trails often have negative impacts to wildlife habitat, sensitive plant population, water quality, other recreation resources, and public safety. In many locations within the project area, the density of existing vegetation or surface material physically discourages users from leaving a designated trail.

In some instances, off-highway vehicle users access areas of the forest which have been administratively closed to such use in order to protect resources or non-motorized recreation experiences. Such illegal use also creates impacts associated with unauthorized user created trails.

Traffic Congestion

During peak summer and winter recreation periods, traffic associated with forest users can cause congestion on arterial travel routes such as Highways 50, 89, and Pioneer Trail. Popular developed recreation facilities such as those found along Hwy 89 near Camp Richardson generate and attract visitors with private vehicles. Parking demand and pedestrian/bicycle/vehicle conflicts at these sites can cause delays in travel times and generate concerns for public safety.

Overview of the Affected Environment

Recreation visitors within the project area come from around the world and nation, however the greatest concentration of users come from nearby population concentration centers such as San Francisco, Sacramento, and Reno that are within driving distance. Additionally, many local residents enjoy recreation activities on NFS lands and consider this public land part of their “backyard”. Public interest in recreation resources and access within the project area is high. Many visitors have generational connections to Lake Tahoe, with families regularly sharing their favorite Tahoe locations with younger generations.

Over the last several years the LTBMU has sold inexpensive permits to the public authorizing the cutting of small diameter trees, under the Christmas tree cutting program, during the winter holiday season. This has been a very popular program with the public and all available permits have been sold before demand for them waned. This program has encouraged the public to experience dispersed NFS lands during the winter when they may not ordinarily do so.

Recreation Facilities

Developed recreation facilities within or adjacent to the project area include only the Baldwin Beach day use area. Dispersed recreation facilities include a network of trail and road systems. Cultural heritage sites also serve as recreation destinations throughout the general forest, and can be considered a form of dispersed recreation. The Meiss cabin is an example of this type of site within the project area.

Forest Service system road and trail networks provide valued public recreation opportunities. Among the important trails within the project area are portions of the Pacific Crest Trail, the Tahoe Rim Trail, the PCT-Echo Summit Connector Trail, and the Class 1 Pope-Baldwin bike trail.

Table 3-14 Summary of the recreation facilities within the project area.

Recreation Feature	Description
Meiss Meadow	
Historic Buildings	Cabin, barn, formerly a horse corral
Pacific Crest Trail (PCT)	1.7 miles (0.91 miles of which are shared TRT/PCT) within buffer area (trail crosses back and forth over the activity area multiple times)
Tahoe Rim Trail (TRT)	0.17 miles within buffer area (trail crosses back and forth over the activity area multiple times)
Freel Meadow	
Tahoe Rim Trail (TRT)	0.5 miles within buffer area, 0.1 miles within activity area
Baldwin	
Pope-Baldwin Bike Path	Paved Class I bike trail follows the alignment of SR 89, trail is outside of activity area
Baldwin Beach developed recreation site	Beach day use site including paved access road, parking area, restroom, etc. Managed under Special Use Permit.
Benwood Meadow	
Pacific Crest Trail (PCT)	0.21 miles within buffer area, 0 miles within activity area
Echo Summit Connector Trail	0.3 miles within buffer area, 0 miles within activity area
Hell Hole Meadow	
none identified	
Star Meadow	
none identified	Note: The TRT is located near the meadow but does not cross into the buffer or meadow project area.

Recreation Opportunity Spectrum

The Forest Plan identifies areas of different recreation opportunity spectrum (ROS) classifications based on a range of settings and probable activities that contribute toward the goal of providing a variety of outdoor recreation opportunities. The ROS classifications within the project area are as follows (USDA Forest Service 1988):

Table 3-15 – ROS classes within the project area.

Meadow Name	ROS Class
Meiss	Semi Primitive Non-Motorized
Freel	Semi Primitive Non-Motorized
Baldwin	Rural and Roded Natural ¹
Benwood	Roded Natural and Semi Primitive Non-Motorized ²
Hell Hole	Semi Primitive Non-Motorized
Star	Semi Primitive Motorized and Semi Primitive Non-Motorized ³

1 – Most of Baldwin is Roded Natural except for a small strip of Rural along the lakeshore.

2 – The northern meadow area of Benwood is Roded Natural and the southern area is Semi Primitive Non-Motorized.

3 – Most of Star is Semi Primitive Non-Motorized except for a small strip of Semi Primitive Motorized to the north.

Environmental Consequences

Alternative 1 (No Action)

Direct and Indirect

Alternative 1, the No Action alternative, would result in no short term or direct effects to the recreation resources, access or quality of recreation experience within the project area. Existing patterns of recreation use are expected to remain, and to increase in volume over time. The potential for establishment of user-created trails remains. The establishment of user-created trails is difficult to quantify or assign predictive probabilities.

Under Alternative 1 the potential for establishment of user-created trails would remain somewhat restricted by the current density of standing and downed vegetation within dispersed recreation areas. On-going trail access and travel management planning and implementation within the project area include efforts to eliminate user-created trails that pose a threat to ecological resources or public safety. Maintenance of a high quality Forest Service system trail network also serves to discourage the establishment of user-created trails.

The No Action alternative would not affect the current Christmas tree cutting program administered by the LTBMU; there would be no project-related restrictions or closures on areas, trails, and roads; and there would be no project-related increase in traffic congestion.

Cumulative Impacts

Because there would be no direct or indirect effects to recreation resources as a result of the No Action alternative, there would be no cumulative effects.

Alternative 2 (Proposed Action)

Direct and Indirect

Effects to Quality of Experience

Implementation of Alternative 2, the proposed action, would have direct effects to the recreation resources within the project area. It is anticipated that the project will improve the recreation experience overall. Improvements to scenic stability (see Scenic Resources section of this EA) will help to maintain the experience of recreating in a meadow environment. Improvement to the health of the ecosystem will reduce the conifer encroachment, which reduces the scenic beauty of an area and contributes to a loss of recreation experience.

The forested landscape that would result from implementing Alternative 2 would be more open in character than the current landscape. Some of the standing and downed vegetation that currently helps to keep recreation users on designated trails would be removed. Removal of this material could tempt users to create trail short-cuts or new trails within the project area. The proposed action includes measures, such as placement of physical barriers to discourage establishment of user-created trails.

The re-routed TRT and PCT in the Meiss Meadow will be located further from sensitive plants and soils within the meadow, but the new trail location will still be located within the meadow environment. The new trail alignment was chosen as a balance between the desires of trail users to experience a meadow setting with the potential for resource damage. A re-route of the trail completely outside of the meadow was considered, but not analyzed in further detail because that would fundamentally alter the experience of the TRT and PCT in these areas. 1.1 mile of trail will be rerouted and 1.1 mile of trail will be decommissioned. See Figure 3-8 for a map of the re-routes.

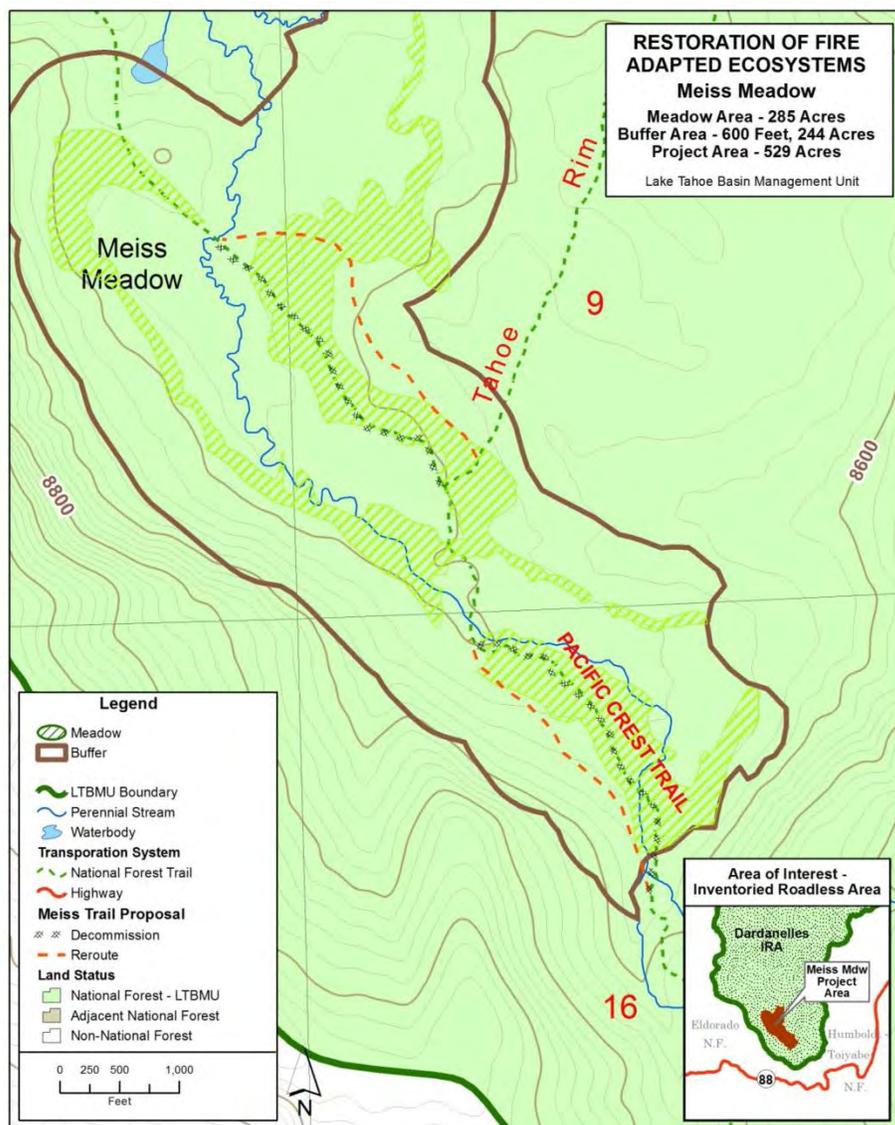


Figure 3-8: Meiss Meadow Trail Re-route.

No changes to the recreation opportunity spectrum classification are anticipated as a result of implementing Alternative 2.

No impact to accessibility is anticipated as a result of implementing Alternative 2. Under Forest Service accessibility guidelines, all newly constructed or altered facilities must meet the applicable ABAAS, FSORAG, and FSTAG standards. With the exception of the horse corral at the Meiss cabin, no facilities are proposed to be constructed or altered in this project. The corral will meet applicable accessibility standards. The re-routed trails will meet applicable accessibility standards, as well. It should be noted that both the corral and re-routed trails would most likely meet “Conditions for Exception” from the accessibility standards. Conditions for an exception are not a blanket exemption from the requirements, but are allowed where an exception is specifically allowed in the technical requirements for that feature in order to ensure that the unique characteristics of the outdoor environment and recreation opportunity at a site aren’t compromised or fundamentally altered (USDA FS FSORAG 2014; USDA FS FSTAG 2014).

Example of conditions for exception are when making the feature meet accessible grades or surface type is not practicable due to terrain or where compliance is precluded because the cultural, historic, or significant natural features are protected or are eligible for protection under Federal law by the National Historic Preservation Act (16 USC 470 et seq.). The presence of conditions for exception does not mean the feature does not meet the accessibility guidelines; rather a condition for departure from the guidelines exists.

Effects to Access

A short-term direct effect during project activities would be temporary Forest Closures implemented to protect the public from safety hazards associated with tree removal and prescribed fire operations. These closures would reduce the public's opportunity to access limited areas of public land for dispersed recreation for periods ranging from one to six weeks. Advanced signage and public outreach would notify as many people as practical of proposed closure periods ahead of time, allowing them to make alternate recreation access plans. Stipulations for advanced coordination with the Pacific Crest Trail Association and Tahoe Rim Trail Association are included in the project design features. Similarly, management activities within or adjacent to Baldwin Beach day use site have the potential to negatively affect visitor's recreation experience. This alternative includes measures to manage the timing of vegetation management activities when practical within these areas to non-peak season periods when visitation rates are anticipated to be lower. Additionally, the treatment areas are outside of the areas that are used most heavily in and around the recreation site. Advanced coordination with the permittee will occur before project activities begin in the area. Temporary closures of areas adjacent to the beach and roads may be necessary, but closure of the entire site is not anticipated.

During vegetation management activities trucks and other equipment will be utilizing public travel routes. These additional vehicles have the potential to increase traffic congestion; however the scale of operations within this project is significantly smaller than other similar fuels projects in the area. Staging areas associated with treatment units that are located near trails or trailheads, will alter the visual landscape and the experience of those recreating in these areas during and following treatment. Resource Protection Measures have been incorporated into this alternative to return these areas to as "naturally appearing" a condition as practical following use. The limitation of the project to hand thinning operations greatly reduces the amount of equipment and the size of staging areas required for equipment.

Implementation of Alternative 2 should have very few short term effects on the current Christmas tree cutting program administered by the LTBMU. Opportunities for individuals and families to cut these small diameter trees within the project area would be reduced during the short term in areas that were recently treated for fuels reduction. With the exception of the areas around the Baldwin Beach site, the project area meadows are not sites generally used for this activity due to their remote locations. The tree cutting program is Basin-wide and the opportunity to select and cut Christmas trees will not be affected in areas outside of the project area.

Cumulative Impacts

Cumulative effects of the proposed action would be additive to the effects of recreation activities and other management activities affecting recreation use within the analysis area. These cumulative effects would be positive in nature when combined with other fuel reduction, forest health, and recreation facility improvement projects in the project area.

Past, present, and reasonably foreseeable future management activities, particularly those implementing access and travel management projects, may add to the cumulative effects of the

proposed action. Temporary recreation closures to improve the sustainability of Forest Service system trails within the project area would be short in duration and limited in scale. These temporary closures, coupled with temporary closures associated with the proposed action have the potential to reduce public access to dispersed recreation opportunities. Establishment of user created trails within the analysis area is unlikely to increase as a result of cumulative effects. Access and travel management activities are anticipated to reduce the overall number of user created trails, and develop a sustainable trail system that both meets user needs and protects resources.

Analytical Conclusions

The no-action alternative would not result in any change to the current recreation opportunities or access in the project areas.

Alternative 2 would improve the recreation experience overall. Improvements to scenic stability (see Scenic Resources section of this EA) will help to maintain the experience of recreating in a meadow environment. Improvement to the health of the ecosystem will reduce conifer encroachment, which reduces the scenic beauty of an area and contributes to a loss of recreation experience. Removal of standing and downed vegetation that currently helps to keep recreation users on designated trails could tempt users to create trail short-cuts or new trails within the project area. However, alternative 2 includes measures, such as placement of physical barriers to discourage establishment of user-created trails. Temporary access restrictions during project implementation would impact recreation opportunities, but the impact would not be significant.

Scenic Resources

Introduction

This chapter describes the affected environment related to scenic resources, and evaluates potential effects of implementing the Restoration of Fire Adapted Ecosystems project on scenic resources.

Methodology

Evaluation of potential effects on scenic resources considers management activities described in Chapter 2. The analysis area being considered is synonymous with the project area. The No-Action alternative is evaluated as a baseline condition in order to provide comparison to anticipated effects under the Proposed Action.

Project activities have the potential to impact scenic resources, both within identified meadow settings and in the forested areas surrounding them. Specific management activities evaluated include: conifer removal, prescribed fire, stream channel head cut restoration, willow planting, trail re-route, re-establishment of the Meiss meadow corral, and vegetation maintenance.

The analysis considers potential effects to valued scenic attributes, scenic stability, and compliance with Visual Quality Objectives (VQOs) as identified in the LTBMU Forest Plan.

Valued scenic attributes are those visual characteristics or features of the landscape that contribute to a positive public experience and an area's "sense of place". Meadows are considered a valued scenic attribute within the landscape because they are generally rare and are visually distinctive compared to the forest dominated landscape within the analysis area. Meadow vegetation is generally characterized by grasses, sedges, rushes, and herbaceous flowering plant cover, which provides a positive visual contrast to surrounding conifer forest. Visibility of landscape features differs based on location and proximity to travel routes, which include major roads and trails.

Scenic stability considers ecological processes over time, specifically whether the valued scenic attributes are likely to persist into the future.

Visual Quality Objectives (VQO) are established in the LTBMU Forest Plan and describe an area's desired natural appearance and degree to which management activity is visually evident. VQO for an area can differ based on viewing distance. This is in recognition that evidence of management activity may not be visually noticeable from a distance, but would likely be noticeable when viewed at close range. Management activity must be consistent with the adopted VQO in order to be consistent with the Forest Plan.

Overview of the Affected Environment

Six meadows are proposed for treatment to accomplish desired conditions consistent with the project purpose and need.

Baldwin Meadow is 121 acres in size and is located on the south shore of Lake Tahoe within the Baldwin Beach developed recreation site. The meadow is dominated by a mixture of grasses, sedges, rushes, and herbaceous dicots. Willows are found along creeks and wetter areas of the meadow, and conifers are found along the meadow edge and are currently encroaching into other areas of the meadow.

Benwood Meadow consists of two meadow areas that total 27 acres in size and are located south of Highway 50 near Echo Summit within the Dardenelles Inventoried Roadless Area. 70 acres of buffer treatment are proposed. The Pacific Crest Trail passes to the west of this area, including an area proposed for buffer treatment. A spur trail leads from the Pacific Crest Trail and leads to both meadow areas. Meadow vegetation typically transitions from dry, upland mixed conifer forests along the outside of the meadow to wet meadow communities dominated by sedges. Current conditions are influenced by conifer encroachment and by minor stream channel head cuts.

Freel meadow consists of two meadow areas that total 21 acres in size and are located north Highway 89 near the top of the Trout Creek watershed within the Freel Inventoried Roadless Area. 29 acres of buffer treatment are proposed. The Tahoe Rim Trail passes through both meadow areas. Meadow vegetation consists of wet and moderately moist herbaceous communities with dryer plant communities around the meadows' periphery. Current conditions are influenced by a combination of stream channel head cuts, past grazing activity, and minor conifer encroachment.

Hell Hole meadow consists of two meadow areas that total 66 acres in size and are located north of Freel meadow, also within the Freel Inventoried Roadless Area. No buffer treatment is proposed in this location due to the boulder/talus fields that surround the meadow. Hell Hole meadow supports a mosaic of vegetation types, and is surrounded by open montane/subalpine forests with chaparral understory, along with exposed talus and granite boulders. Lodgepole pine stands, which currently occur along the meadow's periphery have encroached into the meadow, even in its wettest locations.

Meiss meadow is 285 acres in size, surrounded by the headwaters to the Upper Truckee River, located in Dardenelles Inventoried Roadless Area north of Hwy 88. 244 acres of buffer treatment are proposed. The Pacific Crest Trail and Tahoe Rim Trail passes through the meadow and surrounding buffer treatment area. Meadow vegetation consists of a variety of communities that respond to the area's seasonal snow melt regime. The Meiss Cabin and Barn are historic structures with the meadow area that positively contribute to the area's scenic value. The current meadow condition has been influenced by a combination of past grazing, recreation, conifer encroachment, and stream channel head cuts.

Star meadow is 13 acres in size, located in the Freel Inventoried Roadless Area, near the southeastern boundary of the LTBMU. 56 acres of buffer treatment are proposed. The Tahoe Rim Trail passes above and to the east of the meadow and surrounding buffer treatment area, and a system trail passes to the north of the area. Vegetation communities range from dry, upland forest to saturated meadow and stream sides. The current meadow condition has been influenced by a combination of past grazing activities, conifer encroachment, and a minor stream channel head cut.

Each of the six meadows proposed for treatment have a designated VQO of Retention as identified in the LTBMU Forest Plan. Under the Retention VQO, management activities should not be visually evident when viewed from middleground or background viewing distances. Project effects on scenic resources are described collectively for project activities occurring within the six distinct locations. Where specific distinction between locations is merited, the unique settings or activities are described to highlight effects that do not occur in each location.

Recommended Wild River Direction

The Upper Truckee River has been recommended as a Wild River in the area around Meiss Meadow. This project should harmonize with the area's essentially primitive character and fully protect identified river values.

Environmental Consequences

Alternative 1 (No Action)

Direct and Indirect

Under the No Action alternative, existing conditions will remain and current landscape processes will persist. Meadow vegetation will remain visible from trails and other viewing locations. The No Action alternative will be consistent with VQO of Retention, and there will be no direct effects. Current landscape processes including on-going stream head cut in some locations, conifer encroachment, and a lowering of water tables will continue, with an indirect reduction in the presence of meadow vegetation. This indirect effect represents an anticipated loss of valued scenic attributes over time, resulting in a decrease in the area's scenic stability.

Cumulative Effects

There are no direct effects to scenic resources resulting from the No Action alternative. Indirect effects would lead to a reduction in area scenic stability, with the anticipated loss of valued meadow vegetation scenic attributes over time. When considered in the context of existing unstable landscape conditions throughout the region that result in landscape processes leading to the drying of meadow floodplains and meadow encroachment by conifers, the No Action alternative perpetuates these undesired conditions.

Alternative 2 (Proposed Action)

Direct and Indirect

Conifer Removal

Trees are proposed for removal from both meadow and buffer areas within the six restoration activity sites. Within meadow and buffer areas, trees would be hand-piled for subsequent burning. Within meadow areas trees would be felled and material would be lopped and scattered, for treatment with prescribed broadcast burning. Some larger diameter trees within meadows would be girdled and allowed to die in place.

Removal of trees from the project areas would be a visible change in the landscape when compared to existing conditions, however the long-term appearance of these landscapes would be consistent with the VQO of retention because vegetation patterns and distribution of vegetation communities would mimic those found in similar landscapes and would be consistent with the valued scenic attributes of the area. Short-term visual impacts will exist following vegetation treatment, and will persist until evidence of prescribed fire (described below) has diminished. Cut stumps will be limited in height to six inches, and will not represent a visually dominant feature in the landscape. The visual effects of this activity will be most visible to trail users and other recreation visitors near Meiss, Star, Freel, and Baldwin meadows.

Removal of conifers from these meadow areas will reduce some of the ecological stress from these valued landscapes and increase the likelihood that the valued scenic attributes of meadow vegetation will persist into the future. As such, this alternative would result in an increase in the area's scenic stability.

Prescribed Fire

Pile burning within the meadow and buffer area and broadcast burning within treated meadows will represent the greatest visual impact of all management activities proposed under this alternative. These impacts will be temporal in nature, and will diminish within a few seasons following prescribed fire. Prior to ignition, burn piles will present an un-natural appearing feature in the landscape although the viewed extent of these piles will in most cases be less than those areas treated similarly under other projects in the wildland urban interface. Following ignition and successful burning, blacked burn scars may be visible on the ground, along with partially consumed material and some scorching of live tree trunks. This surface visual evidence will dissipate rapidly with needle cast and regrowth of shrubs and grasses. Evidence of scorched trunks of live trees will not dissipate over time, however these visual patterns are not uncommon in un-treated landscapes. Broadcast burns within meadow areas will result in consumption of lop-and-scattered vegetation as well as meadow plant communities. Following prescribed fire the landscape will appear charred and blackened and may contain surface materials that were not burnt or were only partially burnt. Due to the vegetation characteristics in these areas, the following year's growth is expected to return the area to its valued lush green appearance, and remaining surface materials will become visually obscured by this vegetation response. Prescribed fire will result in a short-term visual impact, but will be consistent with the VQO of retention when considered in the context of the project's time frame. The visual effects of this activity will be most visible to trail users and other recreation visitors near Meiss, Star, Freel, and Baldwin meadows. The Forest Plan Amendment would allow for ignition of prescribed burns 25 feet closer to stream channels. This would have an almost imperceptible effect on the visual quality of the project areas and would not be significant.

Removal of conifer trees from these landscape areas through the application of prescribed fire reduces the long term risks of unmanaged fire in these areas which could result in long-term loss of valued scenery. As such, this alternative would result in an increase in the area's scenic stability.

Stream Channel Head cut Repair

Project activities will utilize hand crews to repair stream channel head cuts less than two feet high using on-site rock, log, willows, and other vegetative material. Utilization of on-site materials will be consistent with the VQO of retention, because the materials will repeat forms, lines, colors, and textures characteristic of the natural landscape. The head cut repair will also typically only be visually evident when viewed from foreground viewing distances. Where this management activity is implemented the effects of stream channel incision processes will be stabilized and will not result in greater channel incision and meadow desiccation into the future. As such, this alternative would result in an increase in the area's scenic stability.

Willow Planting

Willow planting is proposed within the six project areas to improve habitat for willow flycatcher. All planted willows will be of the same species that occur at the meadow site, and would not exceed 20% of the meadow area in sections where late-season standing water is expected. Meadows contribute to the valued scenic quality of meadows due to their intermediate scale, foliage, structure, and deciduous character. This activity would be consistent with the retention VQO because it would utilize existing plant species present in the location to achieve desired goals.

Trail Re-Route

Within Meiss meadow segments of the Pacific Crest Trail and Tahoe Rim Trail are proposed to be re-routed from low-lying wet meadow areas to higher capability soil areas adjacent to the meadow edge. The old trail segments will be decommissioned and restored to a condition which does not impede meadow hydrology. These Congressionally-designated trails are recognized for the scenic values they provide. Project Resource Protection Measures include coordination with the Pacific Crest Trail Association and Tahoe Rim Trail Association during the establishment of the new trail alignment to ensure that the valued scenic character provided by the trail remains. Views of Meiss meadow will remain from the new alignment, and the trail will continue to cross the Upper Truckee River in its current locations.

Meiss Meadow Corral Reestablishment

Within Meiss Meadow the reconstruction of the historic corral adjacent to the Meiss Cabin and Barn is proposed. This activity would utilize conifer trees removed from the meadow and buffer treatment areas to accomplish meadow restoration goals. Because the construction of the corral would be in keeping with the historic architecture of the facilities and replaces a historic structure it would be consistent with the VQO of retention. The visual appearance of the historic cabin and barn are valued scenic attributes that contribute positively to the experience of those viewing the landscape from the Pacific Crest Trail in this area. Reconstruction of the historic corral would help perpetuate these scenic attributes.

Vegetation Maintenance

Proposed project activities include the maintenance of desired post-treatment vegetation conditions within the six meadow areas. Maintenance activities could involve the repeat application of each of the management activities described above. The effects of vegetation maintenance activities are anticipated to be less than those associated with initial treatment phases.

Cumulative Effects

When combined with the effects of past, present, and reasonably foreseeable projects, the direct and indirect effects of this project would not result in significant cumulative effects. Within the southern portion of the Lake Tahoe Basin this project would contribute to the increased presence of burn piles associated with fuels reduction projects in the wildland urban interface. These features are temporary in nature between the time of their creation and their prescribed burning. Combined with the effects of other fuels reduction and forest health projects, this project will contribute to beneficial effects that perpetuate meadow vegetation and their valued scenic characteristics. Trail re-route activities also contribute to improved scenic stability and preservation of scenic values when combined with effects from past, present, and reasonably foreseeable trail retrofit projects.

Analytical Conclusions

Alternative 1 would not result in direct effects to scenic resources, however indirect effects include risks to scenic stability and potential long-term loss of valued scenic attributes associated with meadow vegetation. Alternative 1 would be consistent with the adopted VQO of retention.

Alternative 2 would result in direct and indirect effects to scenic resources. Scenic resources would be negatively affected in the short-term primarily as a result of management activity including tree removal, and prescribed pile and broadcast burning. These and other management activities would be visually evident during and immediately following implementation but their

visibility would diminish over time. Meadows with trail access, or within developed recreation sites (Baldwin, Benwood, Freel, and Meiss meadows) have the greatest visibility, and are most sensitive to the short-term effects of management activities.

Implementation of these management activities would result in long-term benefits to scenic resources by enhancing the valued scenic attribute of meadow vegetation. Management activity would also result in an increase in scenic stability by restoring floodplain hydrology and increasing the likelihood that meadow vegetation in the treatment areas will persist into the future. Alternative 2 would be consistent with the adopted VQO of retention.

Terrestrial Wildlife

Introduction

The purpose of this analysis is to evaluate and disclose the potential effects of the two alternatives for the Restoration of Fire Adapted Ecosystems Project on USDI Fish and Wildlife Service (FWS) terrestrial wildlife species protected under the Endangered Species Act, Forest Service Sensitive (FSS) terrestrial wildlife species and habitat, Tahoe Regional Planning Agency (TRPA) Special Interest Species (SIS) and migratory birds. The two alternatives under consideration (1 and 2) are described in Chapter 2. For additional information refer to the project's Biological Evaluation for Terrestrial Wildlife Species, and the other associated reports for wildlife species, available in the project record.

Methodology

The evaluation of effects involved selecting an appropriate wildlife analysis area, using Geographic Information System (GIS) data to describe current habitat conditions within the analysis area and the type and extent of habitat types available for each terrestrial wildlife species, identifying proposed activities (and magnitude of those activities) that could affect terrestrial wildlife species and habitat and selecting appropriate indicators to evaluate effects, and identifying those terrestrial wildlife species (and habitat) that occur (or could occur) within the analysis area and could be effected by the proposed activities.

Analysis Area

The wildlife analysis area includes most of the south shore of the LTBMU. It includes the project meadows and buffers (action areas) and extends from the south side of Emerald Bay to the forest boundary on the west; south to the forest boundary and to the California/Nevada state line on the east (Figure 3-9) for a total analysis area of 86,790 acres. This analysis area was selected to include all of the project action areas and encompass potential effects.

GIS Data

Except where otherwise noted, the existing habitat conditions (and available habitat types) in the project and wildlife analysis area for terrestrial wildlife species were quantified using the California Wildlife Habitats Relationships v.8.1 (CWHR) personal computer program developed by the California Department of Fish and Wildlife (CDFW; formerly Fish and Game) (CDFW 2005). Geographic information system (GIS) data for CWHR come from the Existing Vegetation (Eveg) GIS layer (<http://www.fs.usda.gov/detail/r5/landmanagement/resourcemanagement/>). Where CWHR (2005) data were available, habitats were quantified by high and moderate capability habitat for each terrestrial wildlife species analyzed. The CWHR program describes vegetation conditions through metrics such as tree size classes and canopy closure and functions as a predictive model of habitat suitability for wildlife species. CWHR ranks habitat suitability for each vegetation type as 0.0 (not suitable), 0.33 (low), 0.66 (moderate), or 1.0 (highly suitable) for each wildlife species. CWHR canopy closure classification system defines "open" canopy as S (10-24% canopy closure) and P (25-39% canopy closure), and "closed" canopy as M (40-59% canopy closure) and D (>60% canopy closure). Tree size classes are defined as: 1 (Seedling)(<1" diameter-at-breast height [dbh]); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(>24" dbh); 6 (Multi-layered Tree) (Mayer and Laudenslayer 1988). Current and historic survey information for terrestrial wildlife species was used to supplement GIS data to evaluate the potential for species occurrence in the analysis area and the suitability of available habitat for the species.

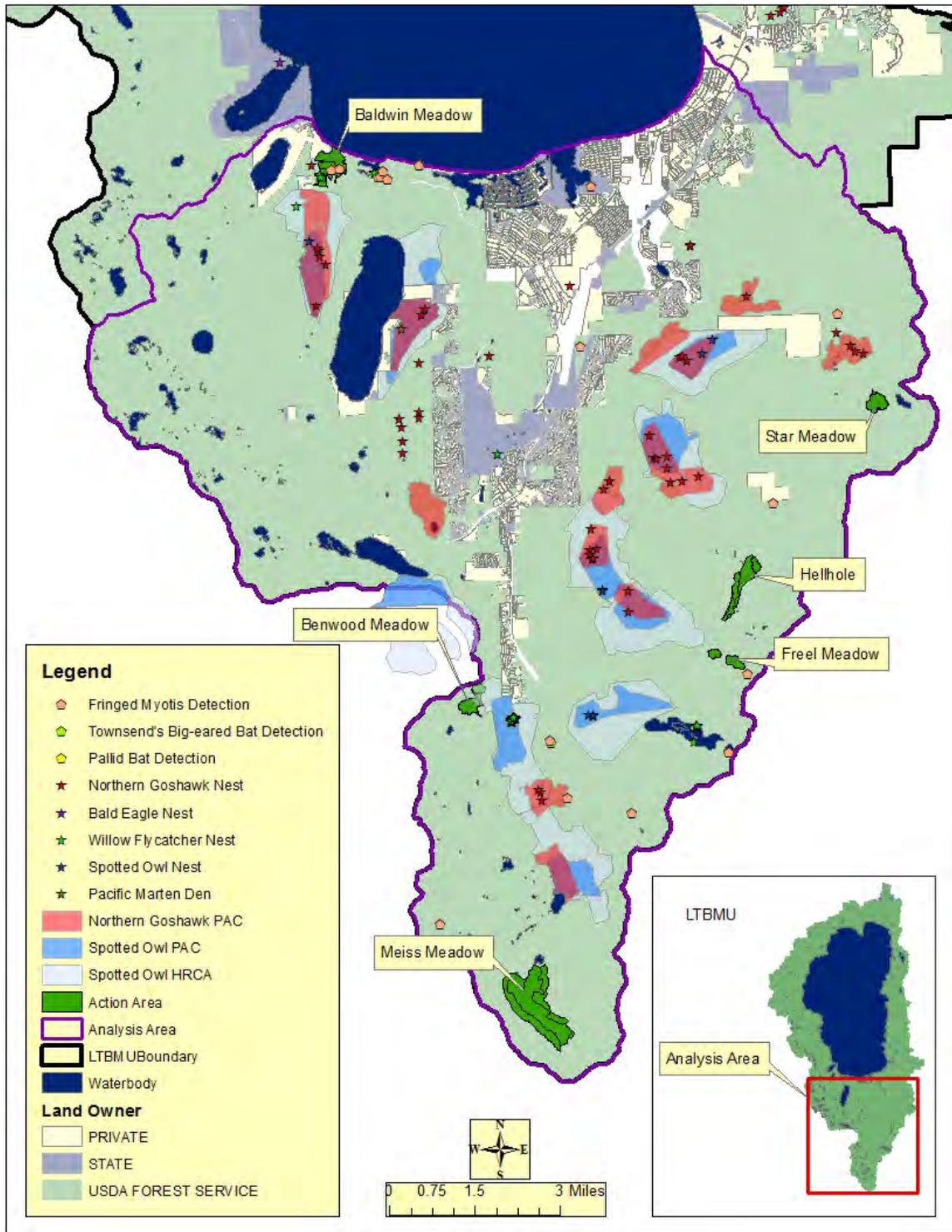


Figure 3-9: The project analysis area, action areas and wildlife occurrences and management areas.

Terrestrial Wildlife Species – FWS and FSS

The analysis evaluated effects to threatened, endangered, candidate, and proposed species under the Endangered Species Act of 1973 (as amended) and Region 5 FSS Species. FWS species lists are based on the August 14, 2014 (verified on August 14, 2014) list of federally threatened, endangered, proposed, and candidate species for the Lake Tahoe Basin Management Unit (LTBMU) (<http://www.fws.gov/sacramento/>). The Pacific Southwest Regional Forester's sensitive species are based on the list that was updated on July 3, 2013. Table 3-16 lists the FWS and FSS species for the LTBMU.

Table 3-16. LTBMU federal candidate and Forest Service sensitive species and their occurrence and/or habitat availability in the analysis area (there are no federally listed or proposed terrestrial wildlife species on the LTBMU).

WILDLIFE SPECIES	LEGAL STATUS ^a	KNOWN TO OCCUR IN ANALYSIS AREA	SUITABLE HABITAT IN ANALYSIS AREA	REASON WHY HABITAT NOT CONSIDERED SUITABLE (OR REASONABLE FOR NO EFFECT)
Birds				
Northern goshawk (<i>Accipiter gentiles</i>)	S	Yes	Yes	
Willow flycatcher (<i>Empidonax traillii</i>)	S	Yes	Yes	
Bald eagle (<i>Haliaeetus leucocephalus</i>)	S	Yes	Yes	
Great gray owl (<i>Strix nebulosa</i>)	S	No	No	The great gray owl is not known to occur on the LTBMU.
California spotted owl (<i>Strix occidentalis occidentalis</i>)	S	Yes	Yes	
Mammals				
Pacific Fisher (<i>Martes pennanti</i>)	C	No	No	The LTBMU is outside of the current known range of fisher.
Pallid bat (<i>Antrozous pallidus</i>)	S	Yes	Yes	
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	S	Yes	Yes	
Fringed myotis (<i>Myotis thysanodes</i>)	S	Yes	Yes	
North American wolverine (<i>Gulo gulo luscus</i>)	PT, S	No	No	The LTBMU is outside of the current known range of the North American wolverine.
Pacific marten (<i>Martes caurina</i>)	S	Yes	Yes	
Invertebrates				
Western bumble bee (<i>Bombus occidentalis</i>)	S	No	Yes	

WILDLIFE SPECIES	LEGAL STATUS ^a	KNOWN TO OCCUR IN ANALYSIS AREA	SUITABLE HABITAT IN ANALYSIS AREA	REASON WHY HABITAT NOT CONSIDERED SUITABLE (OR REASON FOR NO EFFECT)
<p>^a Status explanations</p> <p>No species in the Lake Tahoe Basin are currently listed as “Endangered” by the USFWS under the ESA.</p> <p>PE = USFWS, proposed for endangered species listing under the ESA</p> <p>PT = USFWS, proposed for threatened species listing under the ESA</p> <p>PC = USFWS, proposed species critical habitat under the ESA</p> <p>T = USFWS, threatened species under the ESA</p> <p>C = USFWS, candidate for listing under the ESA</p> <p>S = USFS LTBMU Sensitive Species, Regional Forester’s Sensitive Species List, amended September, 2013</p>				

The LTBMU is outside the geographic range of the Pacific fisher and the North American wolverine. Great gray owl is not known to occur on the LTBMU. Therefore, effects to these species would not occur and there is no further analysis of these species.

Terrestrial Wildlife Species – TRPA and Migratory Birds

In addition to the individual species listed above, effects to TRPA Special Interest Species (SIS) and migratory birds are addressed as a group in this section. The TRPA SIS include northern goshawk, osprey (*Pandion haliaeetus*), bald eagle winter habitat (as mapped by TRPA), nesting bald eagles, golden eagle, (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus anatum*), waterfowl habitat (as mapped by TRPA), and mule deer critical fawn rearing habitat (as mapped by TRPA). For more detailed information on TRPA SIS and migratory birds, please see the Wildlife Resources TRPA Checklist (Project Record) and Migratory Landbird Conservation on the Lake Tahoe Basin Management Unit report (Project Record) that were prepared for this project.

Activities and Indicators

Proposed project activities would remove and also create habitat (depending on alternative) and could affect individuals and/or populations of FWS and FSS species as well as SIS and migratory birds. Project activities could disturb individuals and/or populations of terrestrial wildlife species during implementation. Indicators of effects analyzed include: (1) type and amount of existing habitat for each wildlife species, (2), type and amount of habitat alteration/removal/creation for each wildlife species, and (3) type and magnitude of disturbance for each wildlife species.

Overview of the Affected Environment

Information for the project and analysis areas, and terrestrial wildlife species accounts and status is summarized from more detailed descriptions that can be found in the Biological Evaluation (BE) prepared for the project (Project Record).

Wildlife Analysis Area Condition

The wildlife analysis area includes the project meadows (action areas) and extends from the south side of Emerald Bay to the forest boundary on the west; south to the forest boundary and to the California/Nevada state line on the east (Figure 3-9) for a total analysis area of 86,790 acres. The analysis area includes all lands, regardless of ownership. The analysis area includes all of the south shore of the LTBMU including the town of South Lake Tahoe. One major highway, Highway 50, runs through the analysis area. The elevation ranges from about 6,200 feet at lake

level to about 10,000 feet at the top of Freel Peak. The majority of the analysis area is between 6,200 and 8,000 feet. The majority of the habitat in the analysis area consists of tree dominated habitats (56,457 acres) (Table 3-17) followed by shrub habitats (11,887 acres), herbaceous habitats (4,592 acres) and aquatic habitats (2,545 acres), with the remaining being Barren (7,488 acres), Urban (3,074 acres) or unclassified habitat (747 acres).

Table 3-17. Breakdown of the CWHR habitat types in the analysis area.

Tree Dominated Habitat Type	Acres in the Analysis Area	Shrub Dominated Habitat Type	Acres in the Analysis Area	Herbaceous Dominated Habitat Type	Acres in the Analysis Area	Aquatic Dominated Habitat Type	Acres in the Analysis Area
Sierran Mixed Conifer	16,930	Montane Chaparral	10,483	Perennial Grassland	2,477	Lacustrine	2,428
Jeffrey Pine	14,935	Alpine Dwarf-Shrub	646	Wet Meadow	2,114	Riverine	116
Subalpine Conifer	9,689	Sagebrush	494			Total Acres	2,545
Red Fir	9,135	Low Sage	244	Total Acres	4,592		
Lodgepole Pine	5,177	Bitterbrush	19				
Aspen	333						
White Fir	106	Total Acres	11,887				
Eastside Pine	99						
Montane Hardwood-Conifer	43						
Juniper	9						
Total Acres	56,457						

Forest Service Sensitive Species Accounts and Status

Northern Goshawk

The northern goshawk (*Accipiter gentilis*) is a Forest Service Sensitive species and a TRPA Special Interest Species on the LTBMU.

The LTBMU developed a spatially explicit goshawk nesting habitat model using local goshawk nest stand data to facilitate improved agency understanding and management of goshawk nesting habitat in the LTBMU in 2006. The LTBMU model incorporates vegetation (CWHR type, size and canopy cover), slope, aspect, elevation, distance to streams, and land use types, in addition to Terrestrial Ecological Unit Inventory (TEUI 2004) vegetation data (land type association, potential natural vegetation type, and normalized difference vegetation indices), relative position on slope, and road infrastructure. Nesting habitat characteristics of the LTBMU model were

weighted to achieve a correct classification ratio of 99 percent (79% high, 20% moderate, and 1% low habitat suitability). This model was used for the purposes of this analysis.

There are currently an estimated 129,035 acres of high and moderate capability habitat in the LTBMU and 43,481 in the project analysis area. There are nine territories consisting of 16 PACs in the analysis area. None of the territories are within the action areas. The Baldwin Meadow action area is within 200 meters of the Spring Creek territory (Cascade PAC). It is likely that goshawks from the Spring Creek territory forage within the action area and therefore would experience disturbance type effects. There are no known goshawk territories or PACs in the vicinity of the Benwood Meadow, Meiss Meadow, Round Lake, Freel Meadow, Hellhole, or Star Meadow action areas. The Big Meadow territory/PAC is more than two kilometers southeast of the Benwood Meadow action area. This territory is frequently active and was last known to be reproductively active in 2009. The Round Lake territory/PAC is nearly two kilometers northeast of the Meiss Meadow action area. This territory is not known to have been active since 1992. The Saxon Creek territory (Upper Saxon PAC) is approximately 1.5 kilometers west of the Freel Meadow and Hellhole action areas. There has been no known reproductive effort in this PAC since 1998. Since 1991 the reproductive activity for this territory has been focused in the Middle Saxon Creek PAC (approximately 3.5 kilometers northwest).

Willow Flycatcher

The willow flycatcher (*Empidonax trailii*) is a Forest Service Sensitive species on the LTBMU. An estimated 4,138 acres of high and moderate capability habitat currently exist for willow flycatcher within the LTBMU and 2,738 acres within the project analysis area. There are 18 known historically or recently occupied willow flycatcher sites within the LTBMU. Twelve of these sites are within the analysis area.

As detailed in the SNFPA ROD (USDA Forest Service 2004), willow flycatcher emphasis habitat is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component. Within the analysis area there are 1,536 acres of willow flycatcher emphasis habitat and 78 acres within the project treatment meadows (Meiss Meadow and Hellhole).

The only action area where willow flycatchers are known to occur is Baldwin Meadow (Tallac Creek survey area). Willow flycatchers were known to nest in this meadow in 2005 and 2008-2010. The most recent detection in this area was in 2011. Surveys were conducted in 2013 and 2014 with no detections.

Bald Eagle

The bald eagle, (*Haliaeetus leucocephalus*), was federally de-listed on August 8, 2007 (Federal Registrar Vol. 72, No. 130, pp. 37346-37372) and then placed on the USFS Region 5 Regional Forester's sensitive species list. The winter and nesting bald eagle population in the LTBMU is also designated as a Tahoe Regional Planning Agency (TRPA) Special Interest Species.

There are 188,030 acres of high and moderate capability bald eagle habitat in the LTBMU. This includes all lakes regardless of size or quality and therefore likely over estimates the total amount of habitat available. There are 23,435 acres of high and moderate suitability bald eagle habitat within the analysis area.

The LTBMU manages approximately 370 acres of the Taylor Creek and Tallac Creek wetlands and meadows north of Highway 89 as bald eagle wintering habitat from October 15 through March 15 annually. These wetlands and adjacent uplands are also managed for developed recreation (e.g., Taylor Creek Visitor's Center and Baldwin and Kiva beaches), with survey

estimates of 800,000 visitors each year, most of them during the late spring, summer, and early fall. Suitable habitat exists in close proximity to these extraordinarily popular recreation sites and is identified by signs and fences, where appropriate. The entire designated wintering habitat is within the analysis area and approximately half of it is within the Baldwin Meadow action area.

Annual nesting and winter occupancy surveys are conducted in the LTBMU. Eight winter count survey stations are within the analysis area. Bald eagles are frequently counted along the south shore of Lake Tahoe and at Fallen Leaf Lake during these surveys.

There are no known nests in the analysis area. The Emerald Bay nest is frequently active and is approximately one kilometer northwest of the analysis area. The other three nests are farther away. There are many known perch sites within the analysis area, primarily around Lake Tahoe and Fallen Leaf Lake, but there is also one known near Sawmill Pond and one near Round Lake.

California Spotted Owl

The California spotted owl (*Strix occidentalis occidentalis*) is a Region 5 Forest Service Sensitive Species and a Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat on the LTBMU.

The LTBMU developed a spatially explicit spotted owl nesting habitat model using local spotted owl nest stand data to facilitate improved agency understanding and management of spotted owl nesting habitat in the LTBMU in 2006. The LTBMU model incorporates vegetation (CWHR type, size and canopy cover), slope, aspect, elevation, distance to streams, and land use types, in addition to Terrestrial Ecological Unit Inventory (TEUI 2004) vegetation data (land type association, potential natural vegetation type, and normalized difference vegetation indices), relative position on slope, and road infrastructure. Nesting habitat characteristics of the LTBMU model were weighted to achieve a correct classification ratio of 90 percent. This model was used for the purposes of this analysis. There are currently an estimated 130,387 acres of high and moderate quality habitat in the LTBMU and 46,631 in the project analysis area.

There are nine territories consisting of 10 PACs in the analysis area. They were all surveyed at least twice during the previous 10 years (2004-2013). None of them are within the action area. The Baldwin Meadow action area is approximately 1 kilometer north of the Tallac Creek territory (Spring Creek PAC) and less than 200 meters north of the HRCA. The Tallac Creek territory was last known to be reproductively active in 2002, but the territory was last known to be occupied as recently as 2012. The Benwood Meadow action area includes a portion of the Hawley Grade HRCA, but not the associated PAC. The Hawley Grade territory was last known to be reproductively active in 2000 and occupied as recently as 2008. In order to adequately protect spotted owls in this territory, surveys would be conducted two years prior to implementation and if nesting spotted owls are located an LOP would be utilized. The Saxon Creek territory (Upper Saxon Creek PAC and HRCA) comes within 400 meters of the Freel Meadow action area and 700 meters of the Hellhole action area. The Saxon Creek territory was last known to be reproductively active in 2009 and occupied as recently as 2011. All of the known nests and most of the detections are in the Lower Saxon Creek PAC/HRCA. It is reasonable to expect that owls from these territories forage within the action areas and therefore would experience disturbance type effects. There are no known spotted owl territories, PACs or HRCAs in the vicinity of the Meiss Meadow or Star Meadow action areas.

Pallid Bat

The pallid bat (*Antrozous pallidus*) was recently added to the Region 5 Forest Service Sensitive species list for the LTBMU. There are 23,953 acres of high and moderate capability pallid bat

habitat in the LTBMU and 13,552 acres in the analysis area. Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by researchers with the University of Nevada, Reno and Texas A&M. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites during 2009-2013. There are four detections of pallid bat in the LTBMU, one of which was in the analysis area at the Boathouse Theater (Taylor Creek) in 2010.

Townsend's Big-eared Bat

Townsend's big-eared bat (*Corynorhinus townsendii*) is a Forest Service Sensitive species on the LTBMU.

Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by researchers with the University of Nevada, Reno and Texas A&M. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. Townsend's big-eared bat was first detected on the LTBMU in 2007 in Blackwood Creek and Big Meadow Creek watersheds. The Big Meadow Creek watershed is within the analysis area.

Possible cave and cave surrogate habitats were assessed in 2008 for suitability as Townsend's big-eared bat roost sites within the LTBMU. Additionally, a bat colony was discovered at the historic Newhall house on the east shore of Lake Tahoe. Analysis of data collected at these sites resulted in several detections of Townsend's at both Tahoe Treasure adits and at the Newhall house. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites during 2009-2013. This species has not been positively identified at survey locations in the LTBMU since 2009.

There are 32,970 acres of high and moderate capability habitat Townsend's big-eared bat habitat, not including roosts, in the LTBMU. There are 13,969 acres within the analysis area. There is one Townsend's big-eared bat detection in the analysis area, at Cookhouse Meadow. This was one of the original acoustic detections in 2007. There is not a suitable roost site at that location so this detection was most likely of a foraging individual. There are no known suitable Townsend's big-eared bat roosts in the analysis area. The Mountain Top mine, Boathouse Theater, Taylor Creek Visitor Center, and the Old Mill building are all locations within the analysis area that were explored as Townsend's habitat but none of them were found to be suitable. There are no known cave surrogate structures available for roost habitat within the analysis area.

Fringed Myotis

The fringed myotis (*Myotis thysanodes*) is a bat species that was recently added to the Region 5 Forest Service Sensitive species list for the LTBMU.

Acoustic bat surveys were conducted in the LTBMU during 2004 and 2006-2008 by researchers with the University of Nevada, Reno and Texas A&M. These surveys took place at stream and meadow sites throughout the LTBMU. Mist netting surveys were also conducted by the USFS, Pacific Southwest Research Station Multi-Species Inventory and Monitoring program in 2001 and 2002 at 24 sites throughout the LTBMU. The LTBMU conducted roost exit surveys and acoustic monitoring at several sites during 2009-2013. There are 14,399 acres of high and moderate capability fringed myotis habitat in the LTBMU and 8,792 acres in the analysis area. There have been many detections of fringed myotis in the LTBMU, 19 of which were in the

analysis area. Two of the 19 were within the Baldwin Meadow project area. One was approximately 200 meters south of the Freel Meadow action area. The remaining 16 were not within or adjacent to the action areas of the project.

Pacific Marten

The Pacific marten (*Martes caurina*) is a Forest Service Sensitive and Management Indicator Species (MIS) for the late seral, closed canopy coniferous forest habitat component on the LTBMU. This species was previously classified as American marten (*Martes americana*) but recent genetic and morphological evidence have led to a re-classification as Pacific marten (*Martes caurina*) and of the subspecies *sierrae* (Aubry et al. 2012).

Within the LTBMU, marten appear to be well distributed in the western and southern portions but are comparatively rare in the northern and eastern portions (Slauson et al. 2008). Slauson et al. (2008) analyzed data from several marten surveys that were conducted in the LTBMU between 1993 and 2005 and found that marten were detected at 36% of all sample units that were surveyed, occupying areas supporting mesic conifer forest typically dominated by red fir, white fir, western white pine, and lodgepole pine (Slauson et al. 2008). The majority of detections were made in the western (50% of sites) and southern (31% of sites) regions of the LTBMU. Detections in the northern and eastern portions of the basin were scarce despite 30% of the total survey effort occurring in these two areas, and the authors suggest that these areas may have supported less suitable habitat conditions (e.g., open canopy) due to drier conditions and also likely influenced by the development that has altered the composition and connectivity of suitable habitat along the transition from mesic to xeric forest types from west to east in the LTBMU (Slauson et al 2008).

An estimated 138,092 acres of high and moderate capability habitat currently exist for Pacific marten within the LTBMU. There are 101,841 acres of denning habitat in the LTBMU. Of this, there are 57,737 acres of habitat and 36,395 acres of denning habitat within the analysis area.

There have been multiple mesocarnivore surveys in the analysis area that have detected marten. There were camera and trackplate surveys at Heavenly Mountain Resort in 1993 (camera and trackplate), 1996 (trackplate), 2002 (camera) and 2005 (camera). All of these located marten but no dens. The more recent 2008-2009 territory mapping survey mentioned above also located marten but was not designed to locate dens. There was a trackplate survey conducted in 1993 in the Trout Creek (within the analysis area) drainage but no marten were located. There were six cameras (four of which were within the analysis area) deployed at high elevations around the southeast border of the LTBMU in the fall of 2009. This was an attempt to locate a wolverine that had been reported in the area. No marten (or wolverine) were detected. There are also several incidental detections scattered throughout the analysis area. Trackplate and camera surveys were not capable of detecting dens. Den location is primarily determined by radio tracking individuals. This type of survey has not been conducted in the LTBMU although there are likely greater than 30 breeding females in the LTBMU in any given year, each using many dens for kit rearing. Despite this, two dens have been located incidentally. One is within the analysis area near the east shore of Fallen Leaf Lake. It was last known to be active in 2012.

Western Bumblebee

The Western bumble bee (*Bombus occidentalis*) was recently added to the Region 5 Forest Service Sensitive species list. There are 94 collection records for the Western bumble bee on 11 national forests in Region 5, including seven on the LTBMU (Hatfield 2012). There is only one record of the Western bumble bee on the LTBMU since 2000. The status of the Western bumble

bee in the wildlife analysis area is unknown. However, the wildlife analysis area includes multiple habitats that would contain flowering plants.

TRPA Special Interest Species and Migratory Birds

TRPA Special Interest Species

The northern goshawk and bald eagle (both SIS) have been described in the previous section entitled Forest Service Sensitive Species Accounts and Status; all other SIS are described here.

Osprey (Pandion haliaetus) is associated with open forests with large snags for nest sites that are typically located near open water. Nest sites include large coniferous and deciduous trees, cliffs, and pole tops located near or over water. Surveys have been conducted in the LTBMU for osprey, along the shoreline of Lake Tahoe, Cascade Lake, Fallen Leaf Lake, Marlette Lake and areas further inland where nests are known. There are many known nests within the analysis area. Historically there have been osprey nests near Baldwin Meadow but there is no record of active nests within a 0.25 mile radius of the action area since 2009. There are no known osprey nests in the vicinity of the other five action areas.

Golden eagle (Aquila chrysaetos) is associated with early successional forests and shrub communities for foraging and cliffs and large trees for nesting. Within the analysis area golden eagle surveys were conducted at Angora Peak in 2009; Angora Peak and Round Lake in 2010; and Round Lake in 2011. Golden eagles were detected within the analysis area at Angora Peak, Round Lake and Lake Lucille.

The peregrine falcon (Falco peregrinus) is associated with cliffs, banks, dunes, mounds, and human-made structures for nesting. Nests are usually situated on open ledges or potholes and a preference for southern facing slopes increases with latitude (USFWS 1984). From 2009 through 2013, successful nesting of this species has been confirmed in the LTBMU. Surveys were conducted annually within the analysis area since 2008. The nearest known nest is approximately two kilometers east of the Benwood Meadow action area at Luther Rock.

Waterfowl SIS include species of ducks, geese, shorebirds, loons, grebes, mergansers, rails, gulls, terns, and herons. Waterfowl management areas are mapped for the Lake Tahoe basin. There are nine waterfowl management areas within the analysis area. The Taylor Creek Marsh/Baldwin Marsh management area overlaps the Baldwin Marsh action area. None of the remaining eight overlap or are in the vicinity of project action areas.

Mule deer are associated with riparian areas, meadows, and early to mid-successional habitats. Threats to mule deer include habitat fragmentation and loss. TRPA has mapped critical fawn rearing areas; the analysis area is not within or adjacent to critical fawn rearing areas. However, wet meadows occur in the project action areas and this could be used by foraging mule deer.

Migratory Birds

Migratory birds have become a focus of conservation concern due to evidence of declining population trends for many species. Under the National Forest Management Act (NFMA), the Forest Service is directed to “provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives” (P.L. 94-588, Sec 6 (g) (3) (B)). The January 2000 USDA Forest Service (FS) Landbird Conservation Strategic Plan, followed by Executive Order 13186 in 2001, in addition to the Partners in Flight (PIF) specific habitat Conservation Plans for birds and the January 2004 PIF

North American Landbird Conservation Plan, references goals and objectives for integrating bird conservation into forest management and planning.

In late 2008, a *Memorandum of Understanding between the USDA Forest Service and the USDI Fish and Wildlife Service to Promote the Conservation of Migratory Birds* was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities.

To facilitate a regional approach to bird conservation, regional geographic units called bird conservation regions (BCRs) were developed under the North America Bird Conservation Initiative (<http://www.nabci-us.org/bcrs.html>). BCRs encompass landscapes with similar bird communities, habitats, and resource issues. In *Birds of Conservation Concern 2008*, the U.S. Fish and Wildlife Service (FWS) identified the species in each BCR in greatest need of conservation action and proactive management to prevent the need for listing them as endangered or threatened. These species are termed Birds of Conservation Concern (BCC), and a list is given for each BCR. A BCC may be present in a BCR but not included in that BCR's list because its population numbers are not a concern in that region.

In addition, Audubon California has designated 145 important bird areas in the state. See <http://www.ca.audubon.org/iba> for additional information about these areas.

Environmental Consequences

Direct and Indirect Effects Analysis

Proposed project activities would remove and also create habitat (depending on alternative) and could affect individuals and/or populations of FWS and FSS species, TRPA SIS and migratory birds. Project activities could disturb individuals and/or populations of terrestrial wildlife species during implementation. Potential direct and indirect effects on FWS and FSS terrestrial wildlife species and habitat were determined by evaluating the type and amount of existing habitat for each wildlife species, type and amount of habitat alteration/removal/creation for each wildlife species, and type and magnitude of disturbance for each wildlife species.

Direct effects at all of the action areas could include:

Disturbance type effects to all focal species. Implementation may cause species to avoid the area during the activity but this disturbance should be short term and it is expected that species would return to the area when the implementation disturbance is no longer present.

Cumulative Effects Analysis

Cumulative effects represent (40 CFR 1508.7) the “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions.”

The spatial analysis area encompasses all of the project meadows and extends from the south side of Emerald Bay to the forest boundary on the west; south to the forest boundary and to the California/Nevada state line on the east (86,790 acres). The analysis area includes all land within the analysis area regardless of ownership.

Appendix D includes a summary of projects that are grouped according to categories such as trail, road, and parking BMPs, and stream and riparian area enhancement/restoration. Other information includes past and planned vegetation and fuels management projects conducted by the Forest Service and the California Tahoe Conservancy, Lake Valley and Fallen Leaf Lake Fire Protection Districts, and the City of South Lake Tahoe. Many of these activities are considered beneficial for meeting the project's goal of habitat and forest health improvement. Project data is derived from multiple sources including planning records, Forest Service Databases, GIS, and map estimates.

Possible effects from fuels treatments, pile burning and thinning include:

- Disturbance from human presence (noise and proximity).
- Temporary disturbance from smoky conditions.
- Possible reduction in habitat quality due to reduced canopy cover, large downed logs, large snags, ground cover and shrub cover.
- Disturbance from mechanical and hand thinning of brush and trees.
- Long-term improvement of habitat for sensitive species due to opening of the understory.
- Long-term improvement of riparian habitat due to thinning of conifers in heavily encroached riparian areas.

Possible effects from restoration projects erosion control projects (including trail, road, and BMP's) include:

- Disturbance from human presence (noise and proximity).
- Disturbance from the operation of mechanical equipment.
- Short-term reduction in water quality due to construction.
- Long-term improvement in hydrologic function.
- Long-term improvement of SEZ habitat.
- Long-term improvement of meadow habitat due to reduction of conifer encroachment.

Alternative 1 (No Action)

Northern Goshawk

Direct and Indirect Effects

The no action alternative would avoid effects to northern goshawk and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on Northern goshawk or their habitat there are no cumulative effects expected.

Willow Flycatcher

Direct and Indirect Effects

The no action alternative would avoid effects to willow flycatcher and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on willow flycatcher or their habitat no cumulative effects are expected.

Bald Eagle

Direct and Indirect Effects

The no action alternative would avoid effects to bald eagle and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on bald eagle or their habitat no cumulative effects are expected.

California Spotted Owl

Direct and Indirect Effects

The no action alternative would avoid effects to spotted owl and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on California spotted owl or their habitat there are no cumulative effects expected.

Pallid Bat, Townsend's Big-eared Bat and Fringed Myotis

Direct and Indirect Effects

The no action alternative would avoid effects to all three bat species and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on pallid bat, Townsend's big-eared bat or fringed myotis, or their habitat there are no cumulative effects expected.

Pacific Marten

Direct and Indirect Effects

The no action alternative would avoid effects to Pacific marten and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on Pacific marten or their habitat there are no cumulative effects expected.

Western Bumble Bee**Direct and Indirect Effects**

The no action alternative would avoid effects to Western bumble bee and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on Western bumble bee or their habitat there are no cumulative effects expected.

TRPA Special Interest Species

Effects to northern goshawk and bald eagle were addressed in the project BA/BE. Alternatives is not anticipated to result in direct, indirect or cumulative effects to osprey, golden eagle, peregrine falcon, or mule deer.

Waterfowl**Direct and Indirect Effects**

The no action alternative would avoid effects to waterfowl and their habitat, but would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity.

Cumulative

Since Alternative 1 would have no effect on waterfowl or their habitat there are no cumulative effects expected.

Alternative 2 (Proposed Action)***Northern Goshawk*****Direct and Indirect Effects**

There are nine territories consisting of 16 PACs in the analysis area. None of them are within the action areas. The Baldwin Meadow action area is within 200 meters of the Spring Creek territory (Cascade PAC). It is likely that goshawks from the Spring Creek territory forage within the action area and therefore would experience disturbance type effects as mentioned above. There are no known goshawk territories or PACs in the vicinity of the Benwood Meadow, Meiss Meadow, Round Lake, Freel Meadow, Hellhole, or Star Meadow action areas. The Big Meadow territory/PAC is more than two kilometers southeast of the Benwood Meadow action area. This territory is frequently active and was last known to be reproductively active in 2009. The Round Lake territory/PAC is nearly two kilometers northeast of the Meiss Meadow action area. This territory is not known to have been active since 1992. The Saxon Creek territory (Upper Saxon PAC) is approximately 1.5 kilometers west of the Freel Meadow and Hellhole action areas. There has been no known reproductive effort in this PAC since 1998. Since 1991 the reproductive activity for this territory has been focused in the Middle Saxon Creek PAC (approximately 3.5 kilometers northwest).

Since there is no known reproductive activity in or near the action areas, project implementation is not expected to affect reproductive effort of goshawks.

There are 43,481 acres of goshawk habitat in the analysis area. 99% of the project area where conifers will be removed within the meadow proper is suitable Goshawk habitat. Conifer removal at all six action areas within the meadows will alter 0.5% (228) of the goshawk habitat, which includes 0.07% of high quality habitat (Table 3-18).

Table 3-18. Acres of habitat and acres of habitat removed due to conifer encroachment in each of the project action areas within the meadow.

	Acres of Habitat Removed			Total acres of Goshawk Habitat Removed	Total Acres of Conifer Removal in within meadows
	Low Quality	Moderate Quality	High Quality		
Baldwin Meadow	11.3	21.6	0	32.9	33
Benwood Meadow	2.2	11.4	0.8	14.4	16
Meiss Meadow	39	76.5	6.8	122.3	122.4
Freel Meadow	1.7	6.1	0	7.8	7.9
Hellhole	0.5	19.3	22.6	42.4	42.4
Star Meadow	1.8	4.8	0	6.6	6.6
TOTAL	56.5	139.7	30.2	226.4	228.3

Additional acres of conifer thinning will occur at four of the action areas (Meiss Meadow, Freel Meadow, Star Meadow and Benwood Meadow) in order prevent spread of fire during broadcast burning. There would be a total of 336 acres that would be thinned as a fire buffer. In these areas the post-treatment density would be reduced to 30% and the post-treatment canopy cover would be within a range of 30-40%. This would reduce the goshawk habitat to low - moderate quality foraging habitat at best. Currently only one PAC has an average canopy cover less than 40% (Incline Creek on the northeast edge of the LTBMU). Although there have been a few detections in that PAC, it has not been reproductively active since 1995. However, the resulting stand structure would include healthy dominant and co-dominant overstory trees with a few scattered smaller trees. Species composition would include a large reduction in the amount of lodgepole pine. The species mix that currently exists in the mixed conifer forests will remain but at lower densities. This may result in better goshawk habitat in the long-term.

In addition to the disturbance type effects mentioned above, prescribed fire may cause indirect effects to habitat due to damage to remaining trees caused by scorching.

Rerouting trails out of Meiss Meadow will move the trail away from low quality habitat and closer into high quality goshawk habitat, thereby introducing permanent long-term disturbance effects caused by people and their animals utilizing the trail and habitat fragmentation. All of the PACs in the analysis area have trails or roads (forest service system roads that are used intermittently rather than city or county roads that are used regularly) running through some portion of them. Goshawks seem to adapt to this disturbance, as many of the most active PACs in the LTBMU display this situation. Furthermore, the amount of area involved (1.1 miles) is very small compared to the amount of habitat in the analysis area.

Aside from the disturbance type effects mentioned above, repair of head cuts, re-establishment of the Meiss Corral, and willow planting are not expected to have any direct or indirect effects on goshawk.

Cumulative

None of the territories within the analysis area would be treated by the proposed action. The anticipated effects to goshawk are generally characterized as short term disturbance trending toward long term benefit for the species and its habitat. The cumulative effect of the proposed action, when combined with past, present and reasonably foreseeable future actions is to adversely affect individual goshawks and portions of the suitable habitat present in the analysis area during and immediately following implementation, followed by benefits to goshawks and their habitat as thinned areas mature during the 10 years after implementation. Rerouting of the trail near Meiss Meadow is not expected to constitute a negative cumulative effect as a very small amount of habitat would be affected.

Willow Flycatcher

Direct and Indirect Effects

The only action area where willow flycatchers are known to occur is Baldwin Meadow. Willow flycatchers were known to nest in this meadow in 2005 and 2008-2010. The most recent detection in this area was in 2011. Surveys were conducted in 2013 and 2014 with no detections. Aside from the disturbance effects mentioned under “Direct and Indirect Effects Analysis” above, all of the project activities should have a long-term beneficial effect on willow flycatcher, except re-establishment of the Meiss Corral which would have no effect. Surveys will be conducted in all action areas with willow flycatcher habitat prior to implementation. If willow flycatcher were found to be present in Baldwin Meadow (or any other project meadow) during implementation an LOP would be utilized in order to avoid direct effects to possibly reproducing pairs. Known nest locations would be flagged and protected from willow clipping and burning.

Conifer removal, prescribed fire, and willow planting would be expected to change the vegetative structure in a way that would benefit willow flycatcher. Willow planting specifically, will increase the amount of riparian shrub habitat available for willow flycatcher and may increase the amount of available emphasis habitat. Head cut repair would be expected to raise the water level in the meadow, which would also improve willow flycatcher habitat. Rerouting trails out of meadows would be expected to decrease human disturbance to willow flycatcher.

Cumulative

The proposed action, when combined with past, present and reasonably foreseeable future actions is not expected to have a negative cumulative effect to willow flycatcher because the proposed action is expected to result in a long-term benefit to willow flycatcher and their habitat.

Bald Eagle

Direct and Indirect Effects

While bald eagle may be present at any of the action areas there are no known nests or lakes of a large enough size to be considered good foraging habitat in the action areas except for Baldwin Meadow, which is adjacent to Lake Tahoe. The project activities will not include removal of large overstory trees or large snags. The terrestrial wildlife resource protection measures require an LOP for activities occurring in the wintering area. Additionally, at Baldwin meadow all known perch and roost trees/snags and up to six trees (20 inches DBH or larger) per acre would be retained, where existing conditions permit. Large diameter (larger than 20 inches) trees at Baldwin would be retained where existing conditions permit and project objectives can be met. Conifer removal in the meadows and prescribed burning could lead to the recruitment of future snags and thinning of the forest around the meadows could allow for larger trees in the future.

This would be a benefit to bald eagle habitat. Aside from the disturbance type effects mentioned above, this alternative would have no negative direct or indirect effects on bald eagle.

Cumulative

The proposed action, when combined with past, present and reasonably foreseeable future actions is not expected to have a cumulative effect to bald eagle because effects to survival are unlikely and effects to reproduction are not expected to occur. No cumulative effect to bald eagle habitat is expected.

California Spotted Owl

Direct and Indirect Effects

There are nine territories consisting of 10 PACs in the analysis area. None of them are within the action area. The Baldwin Meadow action area is approximately 1 kilometer north of the Tallac Creek territory (Spring Creek PAC) and less than 200 meters north of the HRCA. The Tallac Creek territory was last known to be reproductively active in 2002, but the territory was last known to be occupied as recently as 2012. The Benwood Meadow action area includes a portion of the Hawley Grade HRCA, but not the associated PAC. The Hawley Grade territory was last known to be reproductively active in 2000 and occupied as recently as 2008. In order to adequately protect spotted owls in this territory, surveys would be conducted two years prior to implementation and if nesting spotted owls are located an LOP will be utilized. The Saxon Creek territory (Upper Saxon Creek PAC and HRCA) comes within 400 meters of the Freel Meadow action area and 700 meters of the Hellhole action area. The Saxon Creek territory was last known to be reproductively active in 2009 and occupied as recently as 2011. All of the known nests and most of the detections are in the Lower Saxon Creek PAC/HRCA. It is reasonable to expect that owls from these territories forage within the action areas and therefore would experience disturbance type effects as mentioned above. There are no known spotted owl territories, PACs or HRCAs in the vicinity of the Meiss Meadow or Star Meadow action areas.

Since there is no known reproductive activity in or near the action areas, project implementation is not expected to affect reproductive effort of spotted owl.

There are 46,631 acres of spotted owl habitat in the analysis area. 100% of the project area where conifers will be removed within the meadow proper is suitable Goshawk habitat. Conifer removal at all six action areas within the meadow will alter 0.5% (228 acres) of the spotted owl habitat, which includes 0.06% of high quality habitat (Table 3-19).

Table 3-19. Acres of habitat and acres of habitat removed due to conifer encroachment in each of the project action areas within the meadow.

	Acres of Habitat Removed				Total Acres of Spotted Owl Habitat Removed	Total Acres Conifer removal within the meadow
	Low Quality	Moderate Quality	High Quality			
Baldwin Meadow	11.5	21.4	0.2	33.1	33	
Benwood Meadow	0	12.7	1.8	14.5	16	
Meiss Meadow	18.8	95	8.6	122.4	122.4	
Freel Meadow	1.3	6.5	0	7.8	7.9	
Hellhole	0.4	24.2	17.7	42.3	42.4	
Star Meadow	2.8	3.8	0	6.6	6.6	
TOTAL	34.8	163.6	28.3	226.7	228.3	

Additional acres of conifer thinning will occur at four of the action areas (Meiss Meadow, Freel Meadow, Star Meadow and Benwood Meadow) in order prevent spread of fire during broadcast burning. There would be a total of 336 acres that would be thinned as a fire buffer. In these areas the post-treatment density would be reduced to 30% and the post-treatment canopy cover would be within a range of 30-40%. This would reduce the spotted owl habitat to low - moderate quality foraging habitat at best. There are not currently any spotted owl PACs that have a canopy cover less than 40%. However, the resulting stand structure would include healthy dominant and co-dominant overstory trees with a few scattered smaller trees. Species composition would include a large reduction in the amount of lodgepole pine. The species mix that currently exists in the mixed conifer forests will remain but at lower densities. This may result in better spotted owl habitat in the long-term. Conifer thinning in the Benwood Meadow action area where it overlaps the Hawley Grade HRCAs would result in at least (or as closely as possible, where existing vegetation conditions permit): 1) two tree canopy layers; 2) dominant and co-dominant trees with average diameters of 24 inches dbh; 3) 50 to 70 percent canopy cover; 4) an average of three to six snags (three in eastside pine and mixed conifer, four in westside pine and mixed conifer, and six in red fir forest types) per acre larger than 20 inches dbh and of variable decay classes; and 5) 10 tons of coarse woody debris per acre larger than 20 inches in diameter (at the large end) and of variable decay classes.

In addition to the disturbance type effects mentioned above, prescribed fire may cause indirect effects to habitat due to damage to remaining trees caused by scorching.

Rerouting trails out of Meiss Meadow will move the trail away from low quality habitat and closer into high quality spotted owl habitat, thereby introducing permanent long-term disturbance effects caused by people and their animals utilizing the trail and habitat fragmentation. All of the PACs in the analysis area have trails or roads (forest service system roads that are used intermittently rather than city or county roads that are used regularly) running through some portion of them. Spotted owls seem to adapt to this disturbance, as many of the most active PACs in the LTBMU display this situation. Furthermore, the amount of area involved (1.1 miles) is very small compared to the amount of habitat in the analysis area.

Aside from the disturbance type effects mentioned above, repair of the head cuts, re-establishment of the Meiss Corral and willow planting are not expected to have any direct or indirect effects on spotted owl.

Cumulative

One of the territories within the analysis area would be treated by the proposed action. The anticipated effects to spotted owl are generally characterized as short term disturbance trending toward long term benefit for the species and its habitat. The cumulative effect of the proposed action, when combined with past, present and reasonably foreseeable future actions is to adversely affect individual spotted owl and a portion of the suitable habitat present in the analysis area during and immediately following implementation, followed by benefits to spotted owls and their habitat as thinned areas mature during the 10 years after implementation. Rerouting of the trail near Meiss Meadow is not expected to constitute a negative cumulative effect as a very small amount of habitat would be affected.

Pallid Bat, Townsend's Big-eared Bat and Fringed Myotis

Direct and Indirect Effects

There is one detection of a pallid bat and one detection of a Townsend's big-eared bat in the analysis area and neither of them is in an action area. There are 19 detections of fringed myotis in the analysis area. One was approximately 200 meters south of the Freel Meadow action area. The remaining 16 are not within or adjacent to the action areas of the project. However, there is a significant amount of suitable habitat for all three species in the analysis area and in the action areas. All three bat species and their habitat could experience some short term effects of the type described above, in the "Direct and Indirect Effects Analysis" section, of the described actions. Conifer removal will not have an effect on potential roost sites because only large diameter trees are required for roosting and no trees over 18" DBH will be removed. Conifer removal could improve the future potential for roosting habitat by improving the overall health of the stand and leaving dominant and over-story trees. Prescribed fire should have the same long-term effect as conifer removal. In addition prescribed fire could increase the amount and availability of foraging habitat, as would willow planting. Rerouting trails out of meadows should also have a long-term beneficial effect on foraging and/or roosting bats and their habitat by removing disturbance from the meadow. Head cut repair and re-establishment of the Meiss Corral should have no effect on bat species beyond the disturbance type effects mentioned above.

Cumulative

The proposed action, when combined with past, present and reasonably foreseeable future actions is not expected to have a negative cumulative effect to pallid bats, Townsend's big-eared bat or fringed myotis because the proposed action is expected to result in a long-term benefit to these bat species and their habitat.

Pacific Marten

Direct and Indirect Effects

There is one known den and several marten detections in the analysis area however, none of them are in or adjacent to the action areas. There is a significant amount of suitable habitat in the analysis area and in the action areas. There are 57,737 acres of martin habitat in the analysis area. 81% of the project area where conifers will be removed within the meadow proper is suitable marten habitat. Conifer removal at all six action areas will alter marten habitat. In the areas where conifers would be removed from the edges of meadows and follow-up prescribed fire occurs, 0.4% of marten habitat would be altered, of which 0.3% is high quality (Table 3-20).

Table 3-20. Acres of habitat and acres of habitat removed due to conifer encroachment in each of the project action areas along the edges of the meadow.

	Acres of habitat removed			Total Acres of Conifer Removal within the meadow
	Moderate Quality	High Quality	Total Acres of Marten Habitat Removed	
Baldwin Meadow	10.6	2	12.6	33
Benwood Meadow	1.3	11	12.3	16
Meiss Meadow	20.9	82.5	103.4	122.4
Freel Meadow	1.1	6.8	7.9	7.9
Hellhole	10.4	31.2	41.6	42.4
Star Meadow	2.1	4.2	6.3	6.6
TOTAL	46.4	137.7	184.1	228.3

Since so little is known about the location of marten dens in the LTBMU, project activities could have a detrimental effect on the reproductive effort of marten if there are dens in the action areas or directly adjacent to the action areas. However, if dens are discovered prior to or during implementation an LOP would be applied to a 100 acre buffer around the den.

Additional acres of conifer thinning will occur at four of the action areas (Meiss Meadow, Freel Meadow, Star Meadow and Benwood Meadow) in order prevent spread of fire during broadcast burning. There would be a total of 336 acres that would be thinned as a fire buffer. In these areas the post-treatment density would be reduced to 30% and the post-treatment canopy cover would be within a range of 30-40%. This change will not reduce the amount of marten habitat but it may change its capability. However, the resulting stand structure would include healthy dominant and co-dominant over-story trees with a few scattered smaller trees. Species composition would include a large reduction in the amount of lodgepole pine. The species mix that currently exists in the mixed conifer forests will remain but at lower densities. This may result in better marten habitat in the long-term. Conifer thinning in marten den buffers (if dens are found) would result in (where existing conditions permit) at least: 1) two conifers per acre greater than 24 inches dbh with suitable denning cavities, 2) canopy closures exceeding 60 percent, 3) more than 10 tons per acre of coarse woody debris in decay classes 1 and 2, and 4) an average of 6 snags per acre on the Westside and 3 per acre on the eastside.

In addition to the disturbance type effects mentioned above, prescribed fire may cause indirect effects to habitat due to damage to remaining trees caused by scorching.

Aside from the disturbance type effects mentioned above, repair of the head cuts, re-establishment of the Meiss Corral, willow planting and trail reroutes are not expected to have any direct or indirect effects on marten.

Cumulative

The anticipated effects to Pacific marten are generally characterized as short term disturbance trending toward long term benefit for the species and its habitat. The cumulative effect of the proposed action, when combined with past, present and reasonably foreseeable future actions is to adversely affect individual marten and a portion of the suitable habitat present in the analysis area

during and immediately following implementation, followed by benefits to marten and their habitat as thinned areas mature during the 10 years after implementation.

Western Bumble Bee

Direct and Indirect Effects

Western bumble bee, if they were to occur in the project area, would be expected to experience disturbance type effects as mentioned above in the “Direct and Indirect Effects Analysis” section. Underground hives and foraging individuals could be lost or temporarily disturbed by all implementation activities. If bumble bees are hibernating in the action areas, they would not expect to be affected because implementation would be conducted outside the hibernation season.

Thinning of the meadow buffers will open up understories to sunlight and possibly stimulate growth (and potential flowering) thereby increasing bumble bee foraging habitat. Additionally, conifer removal would add 228 acres of meadow habitat post-implementation. Broadcast burning of the meadows would temporarily remove those meadows as potential foraging areas for bumble bees (533 acres). However, those meadows should be higher quality foraging habitat in the years following broadcast burning due to an increase in flowering plants.

Rerouting the trail out of Meiss Meadow could disrupt hives but that effect would be balanced by decommissioning an equal amount of trail, which would become suitable habitat over time.

Cumulative

When past, present and reasonably foreseeable future project are considered, there could be a temporary negative cumulative effect to Western bumble bee in the case where action areas are in close proximity to other actions, if these actions take place at the same time. However, habitat condition would be expected to improve over the long-term.

TRPA Special Interest Species

Effects to northern goshawk and bald eagle were addressed in the project BA/BE. Alternative 2 is not anticipated to result in direct, indirect or cumulative effects to osprey, golden eagle, peregrine falcon, or mule deer. While disturbance zones for golden eagle and peregrine falcon exist in the analysis area, they are not present in the action areas. There is also mule deer fawn rearing habitat within the analysis area, but not within action areas. There are known osprey nests (and therefore disturbance zones) present in the Baldwin Meadow action area, but they have not been known to be active since at least 2009 and removal of large snags is outside of the scope of this project. Current nest trees will be retained and nests discovered prior to or during implementation will be subject to the applicable LOP. There is a design feature incorporated in the project description that will maintain snag habitat as described in the TRPA Code of Ordinances (TRPA 2013).

Waterfowl

Direct and Indirect Effects

Direct effects to waterfowl in the Taylor Creek Marsh/Baldwin Marsh waterfowl disturbance zone would be avoided by utilizing an LOP from March 1 through June 30. The following RPM has been incorporated into the proposed action in order to reduce indirect effects to waterfowl: “To maintain visual screening and vegetation for waterfowl, do not conduct prescribed burning within 25 feet of stream corridors and marsh areas.” This RPM will protect waterfowl habitat in the short-term. Prescribed burning should result in a long-term improvement in waterfowl habitat due to increased plant diversity and vigor.

Cumulative

The anticipated effects to waterfowl are generally characterized as short term disturbance trending toward long term benefit for the species and its habitat. When combined with past, present and reasonably foreseeable future actions no cumulative effect is expected as only one of the 17 waterfowl disturbance zones in the LTBMU will be affected.

Migratory Birds

The project could have potential adverse short-term impacts to migratory birds related to human disturbance and noise. However, LOPs would be put in place to protect sensitive landbird species during the nesting season if the species were confirmed to be nesting.

Removal of conifers, willow clipping and both prescribed burning and pile burning will occur. Potential impacts to migratory species would be minimized through the adherence of LRMP Standards and Guidelines for snags/down woody debris and limited ground disturbance. Specific resource protection measures include snag retention for wildlife unless the snag would be hazardous to operations and/or human safety; existing CWD retention, especially for those greater than 20 inches DBH; pre-implementation surveys for sensitive bird species; protection of PACs; and education of implementation crews and reporting mechanisms for crews to report incidental sightings. While some conifer habitat would be lost, the project is expected to improve habitat over the long-term.

Analytical Conclusions

Alternative 1 (no action) would avoid effects to all focal species and their habitat. However, it would also forgo the opportunity to improve fire return interval, reduce the density of conifer encroachment, repair damage from grazing, repair channel incision and head cuts, improve resiliency, move trails away from meadows and improve meadow structure and diversity. All of which are the long-term effect of human disruption of the natural condition in the Lake Tahoe area. Alternative 1 would forego the opportunity to correct some of these long-term effects.

Alternative 2 (proposed action) would cause disturbance type effects to all species present in the action areas. Species that avoid the action areas during implementation would be expected to return when implementation (i.e. disturbance) is complete. All focal species, if determined to be nesting, denning or roosting (bats), in the project action areas would be protected in order to avoid impacts to these species. While some habitat would be degraded or removed (goshawk, spotted owl, marten), this removal would result in improved habitat for other species (willow flycatcher, bats, Western bumble bee, mule deer, and waterfowl). Willow planting and head cut repair will further improve wet meadow habitat, which is a severely limited habitat in the LTBMU.

Overall, Alternative 2 would have the larger benefit to the greater number of species and to wet meadow habitats in the LTBMU.

Chapter 4: Consultation and Coordination

The Forest Service consulted the following individuals, Federal, State, tribal, and local agencies during the development of this environmental assessment:

ID Team Members:

Ashley Sommer, Recreation Planner
Courtney Rowe, Botanist
Daniel Cressy, Scenic Resources
Kyle Jacobson, Fire
Matt Dickinson, NEPA Specialist
Rita Mustatia, Silviculture
Sarah Muskopf, Aquatic Biologist
Shana Gross, Ecologist
Stephanie Coppeto, Wildlife Biologist
Tom Fuller, Archeologist

Federal, State, and Local Agencies:

Alpine County Board of Supervisors
California Department of State Parks
California Tahoe Conservancy
Eldorado County Board of Supervisors
Eldorado National Forest
Humboldt-Toiyabe National Forest, Carson Ranger District
Lahontan Regional Water Quality Control Board
California Department of Forestry
Tahoe Regional Planning Agency
U.S. Fish and Wildlife Service, Reno Fish and Wildlife Office
U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office
U.S. Army Corps of Engineers

Tribes:

Washoe Archive and Cultural Center
Washoe Tribe of NV and CA, Environmental Protection Department

Others:

Craig Thomas, Sierra Forest Legacy
Ebright Family
Jennifer Quashnick
Jenny Hatch, CALTROUT
Justin Kooyman, Pacific Crest Trail Association
League to Save Lake Tahoe
Michael Donohoe, Sierra Club
Office of Planning and Research, CA State Clearinghouse
Tahoe Rim Trail Association

Appendices

Appendix A: Summary of Project Best Management Practices (BMPs) for the Restoration of Fire Adapted Ecosystems Project

USFS Region 5 Water Quality Management Handbook (2011).

NOTE: This is only a summary of the BMPs from the Handbook for the purposes of the EA, the entire BMP descriptions from the Handbook should be used for implementation and monitoring purposes.

Best Management Practice	Description
BMP 1.18: Meadow Protection	At a minimum, meadow protection requirements contained in Forest Land and Resource Management Plans must be identified and implemented. Damage to designated meadows and/or their associated protection zones will be repaired in a timely manner. Damage to a streamcourse or streamside management zone (SMZ) caused by unauthorized operations will be repaired in a timely and agreed upon manner.
BMP 1.19: Streamcourse Protection (Implementation and Enforcement)	Streamcourse protection principles including but not limited to the following will be carried out: all damage to streamcourses, including banks and channels, must be repaired to the extent practicable; all debris generated by the project will be removed from streamcourses in an agreed upon manner that will cause the least disturbance; and water bars and other erosion control structures will be located to disperse concentrated flows and filter out sediments prior to entry into a streamcourse.
BMP 1.22: Slash Treatment in Sensitive Areas	Special slash treatment site preparation will be prescribed in sensitive areas to facilitate slash disposal without the use of mechanized equipment.
BMP 2.5: Water Source Development and Utilization	Water source development to supply water for fire suppression shall not reduce downstream water flow to a level that will be detrimental to established uses. Avoid excavation of streambed or bank materials for approaches, drafting pads, and drafting intakes. Screen pump intakes to protect aquatic organisms.
BMP 2.11: Equipment Refueling and Servicing	Service and refueling sites shall be located away from wet areas and surface water. If the volume of stored fuel at a site exceeds 1,320 gallons, project Spill Prevention, Containment, and Counter Measures (SPCC) plans are required. Service residues, waste oil, and other materials must be removed from National Forest land following completion of the project, and responsive actions must be taken in case of a hazardous substance spill, according to the Forest SPCC plan.
BMP 4.10: Location of Pack and Riding Stock Facilities and Use Areas in Wilderness, Primitive, and Wilderness Study Areas	To avoid degradation of water quality from pack, riding stock facilities, and heavy-use areas, this practice directs the location of pack and riding stock facilities to locations away from springs, streams, lakes, wet meadows, and other surface waters where pollution is likely to occur.
BMP 5.4: Revegetation of Surface Disturbed	On unstable soil surfaces resulting from project activities, revegetation with native seed and/or application of mulch may be required to protect water quality and minimize soil erosion. The onsite factors evaluated will include

Best Management Practice	Description
Areas	soil productivity, topography, EHR, and soil water holding capacity.
BMP 5.5: Disposal of Organic Debris	The project IDT will determine the methods of debris disposal and/or placement of debris after treatment. Methods of disposal include: prescribed burning, lop and scatter, and piling.
BMP 6.1: Fire and Fuel Management Activities	To reduce public and private losses and environmental impacts that result from wildfires and/or subsequent flooding and erosion, measures including the use of prescribed fire will be used to achieve defensive fuel profile zones, fuel reduction units, and fire suppression activities.
BMP 6.2: Consideration of Water Quality in Formulating Fire Prescriptions	To ensure water quality protection while achieving management objectives through the use prescribed fires, prescription elements will include, but not be limited to, factors such as fire weather, slope, aspect, soil moisture, and fuel moisture. The prescription will include at the watershed and subwatershed level the optimum and maximum burn block size, aggregated burned area, acceptable disturbance for contiguous and aggregate length for the riparian/SMZ, and maximum expected area covered by water repellent soils.
BMP 6.3: Protection of Water Quality from Prescribed Burning Effects	Implementation of techniques to prevent water quality degradation, maintain soil productivity, and minimize erosion from prescribed burning. These techniques include: constructing water bars in fire lines, reducing fuel loading in drainage channels, and retaining or re-establishing ground cover as needed to keep erosion of the burned site within the limits of the burn plan.
BMP 7.1: Watershed Restoration	To repair degraded watershed conditions and improve water quality and soil stability, utilize the following watershed restoration techniques: improve ground cover density, improve infiltration, and improve overall watershed function.
BMP 7.3: Protection of Wetlands	Activities and new construction in wetlands will not be permitted whenever there is a practical alternative. Factors relevant to the survival and quality of the wetlands, such as water supply, water quality, recharge areas, habitat diversity and stability, and hydrologic function of riparian areas will be considered when evaluating proposed actions in wetlands. Replacement in kind of lost wetlands should be evaluated to apply a “no net loss” perspective to wetland preservation.
BMP 7.4: Forest and Hazardous Substance Spill Prevention Control and Counter-measure (SPCC) Plan	To prevent contamination of waters from accidental spills, a Spill Prevention Containment and Counter Measures (SPCC) Plan must be prepared if the total oil products on site in above-ground storage exceed 1320 gallons, or if a single container exceeds 660 gallons.
BMP 7.8: Cumulative Off-Site Watershed Effects	Cumulative Watershed Effects (CWE) analyses are used to protect identified beneficial uses of water from the combined effects of multiple management activities.

Appendix B: Bd (*Batrachochytrium dendrobatidis*) Disinfection Protocol

Disinfection of Field Gear

All field gear (footwear, nests, etc) that comes in contact with water is disinfected using a 0.016% solution of quaternary ammonia between meadows greater than 100 m apart to prevent the spread of amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) and other potential pathogens (Johnson et al. 2003).

Gear should be disinfected between any meadows more than 100m apart. When moving among hydrologically connected sites (less than 100m) disinfection is probably neither useful nor practical.

However, if travelling across steeper topography with significant cascades or barriers to amphibians, such as ridges, then error on the safe side and disinfect. For example, disinfect between Upper and Lower Kerrick, or between Upper and Lower Cathedral Lakes, or between significant reaches of Lyell Canyon. For this same reason, when possible, survey large meadows from the higher end to the lower end.

At the site which you are leaving, rinse all infected gear to remove mud and debris. Then mix 7 eye drops of Quat 256 per liter of water, in a drybag, and immerse and saturate all contaminated gear for 5 minutes, mixing occasionally. Do this away from water.

Discard the quat mixture in broken-down organic soil in a non-vegetated area away from water. A trail path often works well. Cover lightly with soil.

Continue to your next survey location. When you arrive, retrieve enough water from the meadow (using your dry bag) to rinse your disinfected gear. Discard the rinse water as carefully as you would the original disinfecting quat mixture.

For Further Reference see: http://www.parcplace.org/Bd_conference.html

Appendix C: Limited Operating Periods as of 1 March, 2014

REASON FOR RESTRICTION	LIMITED OPERATING PERIOD AND IMPACTED ACTIVITIES	ADJUSTMENTS ALLOWED
Bald eagle wintering area: Baldwin/Taylor & Pope Marshes	October 15 through March 15 – restricted recreational access and management activities (LRMP ¹ IV-90 #12); no habitat manipulation within mapped wintering habitat unless such manipulation is necessary to enhance the quality of the habitat. (TRPA ²).	None, except for emergency situations
Bald eagle nest site	March 1 through August 31 (based on local breeding season) - no habitat manipulation or physical disturbance within ½ mile of a perch site or nest tree, unless manipulation is necessary to enhance the quality of the habitat (TRPA).	Surveys confirm no nesting or occupancy, TRPA approval
Golden eagle nest site	March 1 through July 31 (based on local breeding season) - no habitat manipulation within ¼ mile of perch sites or nests unless manipulation is necessary to enhance the quality of the habitat (TRPA).	Surveys confirm no nesting or occupancy, TRPA approval
Osprey nest site	March 1 through August 15 (based on local breeding season) - no habitat manipulation within ¼ mile of perch sites or nest trees, unless manipulation is necessary to enhance the quality of the habitat (TRPA).	Surveys confirm no nesting or occupancy, TRPA approval
Peregrine falcon nest site	April 1 through July 31 - restrict recreational activity (rock climbing) on nesting cliffs (LRMP IV-26 #12); no physical disturbance or habitat manipulation within ¼ mile of nest sites, unless manipulation is necessary to enhance the quality of the habitat (TRPA).	Surveys confirm no nesting or occupancy, TRPA approval
Northern goshawk PAC ⁵	February 15 through September 15 - no vegetation treatments (timber thinning, prescribed fire, restoration, road or trail building) within ¼ mile of nest sites (SNFPA ³ S&G ⁴ #76); no physical disturbance or habitat manipulation within the disturbance zone (500 acres of the best habitat surrounding a nest, including a ¼ mile radius around a nest tree), unless manipulation is necessary to enhance the quality of the habitat (TRPA).	SNFPA S&G #76 & #79, TRPA approval
California spotted owl PAC	March 1 through August 15 - no vegetation treatments (timber thinning, prescribed fire, restoration, road or trail building) within ¼ mile of the activity center, unless surveys confirm that California spotted owls are not nesting (SNFPA S&G #75, #77, & #78).	SNFPA S&G #77 & #78
Great gray owl PAC	March 1 through August 15 – no vegetation treatment or road construction within ¼ mile of an active great gray owl nest stand (SNFPA S&G #83).	SNFPA S&G #83
Willow flycatcher nest site	June 1 through August 31 - no timber thinning, prescribed fire, restoration, grazing, utilities work, road or trail building in suitable habitat around active nest (SNFPA, as updated for local conditions).	SNFPA S&G #58
Waterfowl	March 1 through June 30 – manage suitable wetlands for low levels of human disturbance, harassment by dogs must be controlled (LRMP IV-26 #12).	Pope Beach opens on Memorial Day
Pacific marten den site	May 1 through July 31 - no vegetation treatments (timber thinning, prescribed fire, restoration, road or trail building) within ¼ mile (SNFPA S&G #88).	SNFPA S&G #88
Fisher den site	March 1 through June 30 - no vegetation treatments (timber thinning, prescribed fire, restoration, road or trail building) within ½ mile (SNFPA S&G #85).	SNFPA S&G #85
Townsend's big-eared bat	May 1 through August 31 – no habitat manipulation within 300 feet of roost sites, unless surveys confirm that bats are not present (U.S. Forest Service, Region 5 bat coordinator).	Surveys confirm bats are not present

^a This document based on current direction as of 1 March, 2014

¹ LRMP = Lake Tahoe Basin Management Unit Land and Resource Management Plan, 1988. U.S. Department of Agriculture, Forest Service, Lake Tahoe Basin Management Unit. 269 pages.

² TRPA = Tahoe Regional Planning Agency, Code of Ordinances, 2013. Tahoe Regional Planning Agency, Ch. 62, 606 pages.

³ SNFPA = Sierra Nevada Forest Plan Amendment, January 2004. Final Supplemental Environmental Impact Statement, Record of Decision. U.S. Department of Agriculture, Forest Service, Pacific Southwest Region, Vallejo, CA. 71 pages.

⁴ S&G = standard and guideline.

⁵ PAC = protected activity center.

Appendix D: Other Projects Considered in Project Level Effects

Analysis

This appendix is a summary of other project and activities within the analysis area that are relevant to the individual resources effects analyses found in Chapter 3. The following pages list the types of projects and respective activities as well as a brief description of magnitude described in acres and/or in miles (Tables A-1 – A-3). Project data is derived from multiple sources including planning records, Forest Service Databases, GIS, and map estimates.

The information in this appendix includes a summary of restoration projects that are grouped according to categories such as Trail, Road, and Parking BMPs, and Stream and Riparian Area Enhancement/Restoration. Other information includes past and planned vegetation and fuels management projects conducted by the Forest Service and the California Tahoe Conservancy, Lake Valley and Fallen Leaf Lake Fire Protection Districts, and the City of South Lake Tahoe. Many of these activities below are considered beneficial for meeting the projects goal of habitat and forest health improvement.

Table A-1 Summary of Forest Service Restoration Projects from 1994-2014

Trail, Road, and Parking BMPs (decommission, upgrade, reconstruct)	
20 Projects 1997-2014	Magnitude of Projects – 55 acres, 68 miles road and trail
8 Projects 2015-2018	Magnitude of Projects – 261 acres, 26 miles road and trail
Stream and Riparian Area Enhancement/Restoration	
8 Projects 1994-2014	Magnitude of Projects – 41.5 acres, and 0.6 miles
7 Projects 2015-2018	Magnitude of Projects – 672 acres, and 12.7 miles

Table A-2. Past Vegetation/Fuels Management within the Project Area from 1986 to 2014 (includes all ownerships)

Activity	Acres
Hand Thin	6,241
Pile Burn	12,054
Under Burn	5,505
Mechanical Thinning	9,148
Mechanical Chipping or Mastication	9,779
Mechanical Pile	131
Hand Lop and Scatter	1,400
Helicopter Yarding	850
Note: These acres represent some duplicative acres based on primary and secondary treatments or multiple entries within a single acre (i.e. footprint acres).	

Table A-3. Estimated Planned Vegetation and Fuels Management activities from 2015-2018. Activities are comprised of a total of 6 projects, including other Forest Service and Community Fire Safe Projects.

Activity	Acres
Hand Treatment	4,030
Mechanical Treatment	1,272
Prescribed Fire	5,630

Appendix E: Riparian Conservation Objective Analysis

An analysis describing how proposed projects will accomplish consistency with the Riparian Conservation Objectives is required by Standard #92 in the Sierra Nevada Forest Plan Amendment (USDA, 2004), which amended the LTBMU Land and Resource Management Plan (USDA, 1988) in 2004. This report fulfills that requirement by describing how the project design will meet the aquatic management strategy standards tied to each RCO, and is part of the forest plan consistency analysis required by the National Forest Management Act. Additional documentation on consistency of this project with the LTBMU Land and Resource Management Plan is available upon request.

The following management areas were identified in the LTBMU Forest Plan (1988) and fall within the Restoration of Fire Adapted Ecosystems Project area: Fallen Leaf, Meiss, and Freel. Each of these management areas have specific direction provided in the Forest Plan. During the pre-NEPA analysis, it was determined that the Restoration of Fire Adapted Ecosystems Project proposed action is consistent with the management area direction in the Forest Plan.

Riparian Conservation Objective #1

Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.

The designated beneficial uses of water in the analysis area are listed below, and come from the Lahontan Regional Water Board Basin Plan (Lahontan Basin Plan, 2005):

- Municipal and domestic supply
- Agricultural supply
- Ground water recharge
- Freshwater replenishment
- Navigation
- Water contact recreation
- Non-contact water recreation
- Commercial and sportfishing
- Cold freshwater habitat
- Wildlife habitat
- Preservation of biological habitats of special significance (Lake Tahoe, Osgood Swamp, Grass Lake Wetlands, and Grass Lake only)
- Rare, threatened, or endangered species (Heavenly Valley Creek, Meiss Meadows/Wetlands, Meiss Lake, Taylor Creek Meadow Marsh, and Cascade Lake only)
- Migration of aquatic organisms
- Spawning, reproduction and development (applies to waters that support high quality aquatic habitat necessary for reproduction and early development of fish and wildlife)
- Water quality enhancement
- Flood peak attenuation/flood water storage

Of the 16 beneficial uses (BU) identified for surface waters within the Restoration of Fire Adapted Ecosystems Project area, about half of them have the potential to be affected by project activities. These include: ground water recharge; non-contact water recreation; cold freshwater habitat; wildlife habitat; preservation of biological habitats of special significance; rare, threatened or endangered species; spawning, reproduction and development; water quality

enhancement; and flood peak attenuation/flood water storage. All of the beneficial uses identified above are expected to be positively affected, with the long-term result being an advantage to the beneficial use.

These beneficial water uses will also be supported with the proposed project activities by reducing the risk of wildland fire, improving the condition of riparian and meadow areas, and the associated improvements to watershed conditions and water quality.

Analysis of Standards and Guidelines associated with RCO #1

S&G 95: For waters designated as “Water Quality Limited” (Clean Water Act Section 303(d)), implement appropriate State mandates for the water body, such as Total Maximum Daily Load (TMDL) protocols.

- A TMDL was completed in 2010 for Lake Tahoe. The primary pollutant of concern for Lake Tahoe’s clarity is fine sediment (i.e., particles <16 µm). Throughout the project documentation, the potential for sediment delivery and water quality effects are discussed in general, however the fine sediment component has also been considered and will be addressed with project resource protection measures and BMPs.

S&G 96: Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.

- It is not expected that project activities will adversely affect water temperatures. The project resource protection measures prohibit the removal of bank stabilizing and shade providing trees adjacent to fish bearing streams unless approved by a watershed specialist in order to maintain adequate stream surface shade such that stream temperatures do not exceed those necessary for local aquatic-dependent species.
- If monitoring of critical areas for local aquatic species identifies significant deterioration of habitat conditions based on project activities, recommendation for species protection measures will be provided to the decision maker (i.e., Forest Supervisor).

S&G 97: Limit pesticide applications to cases where project level analysis indicates that pesticide applications are consistent with riparian conservation objectives.

- Not applicable. Pesticide application is not a proposed activity with this project.

S&G 98: Within 500 feet of known occupied sites for the California red-legged frog, Cascade frog, Yosemite toad, foothill yellow-legged frog, mountain yellow-legged frog, and northern leopard frog, design pesticide applications to avoid adverse effects to individuals and their habitats.

- Not applicable. Pesticide application is not a proposed activity with this project.

S&G 99: Prohibit storage of fuels and other toxic materials within RCAs and CARs except at designated administrative sites. Prohibit refueling within RCAs and CARs

unless there are no other alternatives. Ensure that spill plans are reviewed and up-to-date.

- The only fuel storage associated with this project is for chainsaws. Fuel containers would be stored and refueling chainsaws will occur within RCAs and CARs, since most of the project area is within RCAs and two proposed meadows are within CARs. Spill prevention and cleanup of hazardous materials will be implemented in accordance with the LTBMU Hazardous Spill Notification and Response Plan.

Riparian Conservation Objective #2

Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

The Restoration of Fire Adapted Ecosystems Project activities will restore headcuts in selected meadows, but are not otherwise expected to alter the geomorphic or biological characteristics of special aquatic features, streams, or hydrologic connectivity. In addition, project resource protection measures have been developed to prevent any negative effects to these features or processes. The proposed conifer removal from project area meadows will potentially restore meadow areas to a more naturally functioning condition.

Analysis of Standards and Guidelines associated with RCO #2

S&G 100: *Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.*

- Two segments of the Pacific Crest Trail through Meiss Meadow that are impeding meadow hydrology will be rerouted out of the low-lying wet meadow areas to higher capability land adjacent to the meadow's edge. The former trail segments will be fully decommissioned and restored so they no longer impede meadow hydrology. Project activities are not otherwise expected to alter hydrologic connectivity.

S&G 101: *Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.*

- No culverts or stream crossing preventing aquatic organism passage have been identified in the project area.
- Water drafting resource protection measures are in place to eliminate potential impacts of drafting on habitat and species.

- The proposed conifer removal from meadows and headcut repair activities will maintain and/or restore a more natural timing, variability and duration of floodplain inundation and water table elevations.

S&G 102: *Prior to activities that could affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside of the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.*

- Watershed Assessments (including channel condition assessments) have been completed for most of the watersheds within the Restoration of Fire Adapted Ecosystems Project area. In general, channel conditions have been altered by past human activities such as: livestock grazing, irrigation, ditching in floodplains, roads, and trails. The resulting channel conditions in some cases exhibit lateral and vertical instability, unstable banks, and/or less frequent overbank flooding. Restoration of Fire Adapted Ecosystems Project activities will repair existing small headcuts in project area meadows, preventing further declines in stream channel condition.
- The project resource protection measures prohibit the removal of bank stabilizing trees adjacent to streams unless approved by a watershed specialist.

S&G 103: *Prevent disturbance to streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites and designated off-highway vehicle routes.*

- Only hand treatment activities are proposed with this project, and are not expected to result in any streambank or shoreline disturbance. The project resource protection measures prohibit the removal of bank stabilizing trees adjacent to streams unless approved by a watershed specialist.

S&G 104: *In stream reaches occupied by, or identified as “essential habitat” in the conservation assessment for, the Lahontan and Paiute cutthroat trout and the Little Kern golden trout, limit streambank disturbance from livestock to 10 percent of the occupied or “essential habitat” stream reach. (Conservation assessments are described in the record of decision.) Cooperate with State and Federal agencies to develop streambank disturbance standards for threatened, endangered, and sensitive species. Use the regional streambank assessment protocol. Implement corrective action where disturbance limits have been exceeded.*

- The livestock proposed for transporting materials associated with prescribed fire activities will be very limited in number and length of stay in any one area. No overnight stays of livestock are expected. Streambank disturbance from livestock will be limited to less than 10% of any stream reach within the project area.
- There are no active grazing allotments within the project area.

S&G 105: *At either the landscape or project scale, determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability for the vegetative community. If outside the range of natural variability, implement restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem.*

- Conifer removal from riparian areas is proposed with the Restoration of Fire Adapted Ecosystems Project actions. These areas have been identified for treatment because conifer encroachment is affecting the condition of the meadow communities. The result of conifer removal will be improved meadow function, decreased competition from conifer species, and improved growing conditions for the native riparian vegetation.
- In addition, willow planting will occur as part of this project in areas previously identified in order to benefit willow flycatcher populations.

S&G 106: *Cooperate with Federal, Tribal, State and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. Maintain in stream flows to protect aquatic systems to which species are uniquely adapted. Minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species.*

- *Not applicable. The project would not result in flow modifications.*

S&G 107: *For exempt hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.*

- Not applicable. There are no hydroelectric facilities associated with the project.

Riparian Conservation Objective #3

Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA.

Because the treatments associated with this project are limited to hand crews, woody debris, slash and bole material will be lopped and scattered in many project area meadows. Although prescribed fire will be used subsequent to conifer removal activities, larger material will likely not be fully consumed in the low intensity fires prescribed. Trees larger than 18 inches that are considered a seed source for future encroachment may be felled, girdled, or piles may be placed underneath to encourage tree mortality.

Analysis of Standards and Guidelines associated with RCO #3

S&G 108: *Determine if the level of coarse large woody debris (CWD) is within the range of natural conditions in terms of frequency and distribution and is sufficient to*

sustain stream channel physical complexity and stability. Ensure proposed management activities move conditions toward the range of natural variability.

- Existing downed trees and large woody debris in perennial and intermittent channels will be left in place. Directional felling will be used to keep trees out of intermittent and perennial channels unless the channel reach is identified as deficient in large woody debris, in which case trees greater than 12 inches may be selected and directionally felled into the channel.

Riparian Conservation Objective #4

Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.

Analysis of Standards and Guidelines associated with RCO #4

S&G 109: *Within CARs, in occupied habitat or “essential habitat” as identified in conservation assessments for threatened, endangered, or sensitive species, evaluate the appropriate role, timing, and extent of prescribed fire. Avoid direct lighting within riparian vegetation; prescribed fires may back into riparian vegetation areas. Develop mitigation measures to avoid impacts to these species whenever ground-disturbing equipment is used.*

- The Hellhole and Upper Truckee CAR encompass the action/project area for Hellhole Meadow and Meiss Meadow respectively. Of the 1707 acres in the Hellhole CAR, 66 are proposed for treatment. Of the 10150 acres within the Upper Truckee CAR, 529 are included in the Meiss Meadow action area. These units within the CARs were designated as hand thinning units to minimize impacts to the CAR. No heavy equipment is proposed. Any use of fire within designated CARs is associated with resource protection measures that consider timing, location, and intensity of fire to eliminate impacts to habitat and species. Any actions associated with the use of fire are intended to improve habitat conditions.
- Prescribed fire treatments will be designed to minimize disturbance to ground cover and riparian vegetation in CARs. Flame heights would not exceed two feet within 25 feet of stream courses or on wetlands unless higher intensities are required to achieve specific objectives. No ignitions will take place within 25 ft of perennial and intermittent channels; however fire will be allowed to back into these areas.

S&G 110: *Use screening devices for water drafting pumps. (Fire suppression activities are exempt). Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses, and tadpoles, from aquatic habitats.*

- *Drafting from streams may occur as part of prescribed fire operations in order to control the rate of spread and duration of fire activity. Screening devices and low entry velocity pumps will be utilized as part of water pump systems in order to prevent removal of aquatic life forms.*

- *Drafting sites will be located in areas that minimize adverse effects to stream flows and pool habitat.*
- *No drafting will occur in Hellhole unless approved by aquatic biologist*

S&G 111: *Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs. In burn plans for project areas that include, or are adjacent to RCAs, identify mitigation measures to minimize the spread of fire into riparian vegetation. In determining which mitigation measures to adopt, weigh the potential harm of mitigation measures, for example fire lines, against the risks and benefits of prescribed fire entering riparian vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could be damaging to habitat or long-term function of the riparian community.*

- *Prescribed fire treatments will be designed to minimize disturbance to ground cover and riparian vegetation in RCAs. Flame heights would not exceed two feet within 25 feet of stream courses or on wetlands unless higher intensities are required to achieve specific objectives.*
- *Hand piling and burning of slash will be located at least 25 ft from perennial and intermittent stream channels or standing water. In addition, pile spacing/density will be limited in SEZs.*
- *Any needed fire lines within meadows would primarily be wet-line construction (using water to saturate the ground rather than physically constructing a line of bare soil), hard fire line would be minimized. All constructed fire lines would be rehabilitated after implementation following Region 5 Best Management Practices (BMPs). Appropriate construction and decommissioning techniques will be determined for fire lines in meadow areas through consultation with a watershed specialist to minimize disturbance to ground cover and riparian vegetation.*

S&G 112: *Post-wildfire management activities in RCAs and CARs should emphasize enhancing native vegetation cover, stabilizing channels by non-structural means, minimizing adverse effects from the existing road network, and carrying out activities identified in landscape analyses. Post-wildfire operations shall minimize the exposure of bare soil.*

- *Not applicable. The project does not propose post-wildfire management activities.*

S&G 113: *Allow hazard tree removal within RCAs or CARs. Allow mechanical ground disturbing fuels treatments, salvage harvest, or commercial fuelwood cutting within RCAs or CARs when the activity is consistent with RCOs. Utilize low ground pressure equipment, helicopters, over the snow logging, or other non-ground disturbing actions to operate off of existing roads when needed to achieve RCOs. Ensure that existing roads, landings, and skid trails meet Best Management Practices. Minimize the construction of new skid trails or roads for access into RCAs for fuel treatments, salvage harvest, commercial fuelwood cutting, or hazard tree removal.*

- Only hand treatments are proposed with this project. No new roads or skid trails will be constructed for project implementation.

S&G 114: *As appropriate, assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for the California red-legged frog, Cascade frog, Yosemite toad, foothill yellow-legged frog, mountain yellow-legged frog, and northern leopard frog.*

- SCI data has been collected on the channels in the Meiss, Baldwin, and Hellhole meadows. All meadows contain suitable habitat for mountain (Sierra Nevada) yellow-legged frog (Table 3-2). Of the species above, only Sierra Nevada (mountain) Yellow-Legged Frog occur in the project area (Hellhole). SCI Inventories have been completed in Hellhole Meadow.

S&G 115: *During fire suppression activities, consider impacts to aquatic- and riparian-dependent resources. Where possible, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RCAs or CARs. During pre-suppression planning, determine guidelines for suppression activities, including avoidance of potential adverse effects to aquatic- and riparian-dependent species as a goal.*

- *Not applicable. This project does not involve fire suppression activities or pre-suppression planning.*

S&G 116: *Identify roads, trails, OHV trail and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic- and riparian-dependent species. At the project level, determine if use is consistent with other standards and guidelines or desired conditions. If inconsistent, modify the use through redesign, rehabilitation, relocation, closure, or re-directing the use to a more suitable location.*

- The LTBMU has completed a roads analysis and BMP upgrades for the entire road system in the project area; the objectives of that project included rehabilitation, relocation, and closure where appropriate and/or necessary to reduce water quality and habitat degradation.
- Two existing trail segments in Meiss meadow have been identified as impeding meadow hydrology. These trail segments will be re-routed out of the low-lying wet meadow areas to higher capability land adjacent to the meadow's edge. The former trail segments will be fully decommissioned and restored so they no longer impede meadow hydrology. Project activities are not otherwise expected to alter hydrologic connectivity.
- No other new trails are proposed and no temporary roads are proposed for this project.

Riparian Conservation Objective #5

Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

Analysis of Standards and Guidelines associated with RCO #5

S&G 117: *Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports: (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).*

- *Not applicable. There will be no range management analysis as part of this project.*

S&G 118: *Prohibit or mitigate ground-disturbing activities that adversely affect hydrologic processes that maintain water flow, water quality, or water temperature critical to sustaining bog and fen ecosystems and plant species that depend on these ecosystems. During project analysis, survey, map, and develop measures to protect bogs and fens from such activities as trampling by livestock, pack stock, humans, and wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to, presence of: (1) sphagnum moss (*Spagnum spp.*), (2) mosses belonging to the genus *Meessia*, and (3) sundew (*Drosera spp.*). Complete initial plant inventories of bogs and fens within active grazing allotments prior to re-issuing permits.*

- Thirty five acres of fen have been delineated within the project area in Baldwin (3.9 ac); Freel (3.0 ac); Hell Hole (19.3 ac); and Meiss (8.8 ac). There are no fens documented in Benwood or Star Meadows. Ground disturbing activities will be excluded from fens, foot traffic will be minimized, felled trees will not be dragged, pile construction will be minimized, and ignition and construction of firelines is prohibited within fens (see Botany BE for more details).
- Livestock will be prohibited in fens.

S&G 119: *Locate new facilities for gathering livestock and pack stock outside of meadows and riparian conservation areas. During landscape analysis, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in riparian conservation areas with riparian conservation objectives.*

- *Not applicable. No new livestock gathering facilities will be created under this project.*

S&G 120: *Under season-long grazing: for meadows in early seral status: limit livestock utilization of grass and grass-like plants to 30 percent (or minimum 6-inch stubble height); for meadows in late seral status: limit livestock utilization of grass and grass-like plants to a maximum of 40 percent (or minimum 4-inch stubble height).*

- *Not applicable. Grazing management is not part of the proposed action. There are no active allotments within the project area.*

Determine ecological status on all key areas monitored for grazing utilization prior to establishing utilization levels. Use Regional ecological scorecards and range plant list in regional range handbooks to determine ecological status. Analyze meadow ecological status every 3 to 5 years. If meadow ecological status is determined to be moving in a downward trend, modify or suspend grazing. Include ecological status data in a spatially explicit Geographical Information System database.

- Not applicable. Grazing management and associated monitoring is out of the scope of this project. There are no active grazing allotments within the project area.

Under intensive grazing systems (such as rest-rotation and deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher than the levels described above if the meadow is maintained in late seral status and meadow-associated species are not being impacted. Degraded meadows (such as those in early seral status with greater than 10 percent of the meadow area in bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid- or late seral status.

- Not applicable. Grazing management is not part of the proposed action. There are no active allotments within the project area.

S&G 121: *Limit browsing to no more than 20 percent of the annual leader growth of mature riparian shrubs (including willow and aspen) and no more than 20 percent of individual seedlings. Remove livestock from any area of an allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation. Herd sheep away from woody riparian vegetation at all times.*

- Not applicable. Out of the scope of the project and there will be no active grazing allotments within the project area.

Riparian Conservation Objective #6

Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.

Conifer removal from riparian areas and meadows is proposed with the Restoration of Fire Adapted Ecosystems Project actions. The areas proposed for treatment have been identified because conifer encroachment has affected the condition of the riparian and meadow ecosystems. The expected results of conifer removal include improved meadow function, decreased competition from conifer species, and enhanced growing conditions for the native meadow vegetation. In addition, headcut repair is proposed in some project area meadows, which will result in restoring these channels and reducing bank erosion and incision.

Additional restoration actions for maintaining, restoring or enhancing water quality and habitat for riparian and aquatic species is outside the scope of this project, and therefore will not be accomplished with the proposed action.

Analysis of Standards and Guidelines associated with RCO #6

***S&G 122:** Recommend and establish priorities for restoration practices in: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests that may be contributing to the observed degradation.*

- Priorities for restoring water tables and stream channels within the Restoration of Fire Adapted Ecosystems Project area have been identified and will be addressed with the proposed headcut repairs in selected project area meadows.
- In addition, an extensive restoration program is underway to restore natural stream processes and watershed function in priority watersheds throughout the Lake Tahoe Basin. Since the mid 1990s stream restoration has been accomplished in Cold Creek and Trout Creek, both within the Restoration of Fire Adapted Ecosystems analysis area. Other out-year restoration projects in the analysis area are in the Upper Truckee River and Saxon Creek.

Analysis of Standards and Guidelines for Critical Aquatic Refuges

***S&G 123:** Determine which critical aquatic refuges or areas within critical aquatic refuges are suitable for mineral withdrawal. Propose these areas for withdrawal from location and entry under U.S. mining laws, subject to valid existing rights, for a term of 20 years.*

- Not applicable. No mining rights exist within the LTBMU boundary, and no known suitable mineral withdrawal sites exist within project area.

***S&G 124:** Approve mining-related plans of operation if measures are implemented that contribute toward the attainment of maintenance of aquatic management strategy goals.*

- Not applicable. No mining-related plans of operation exist within the project area or within the boundary of the LTBMU.

Appendix F: Allotment Grazing History at each of the four allotments and five meadows between 1965 and 2014.

Date	Meiss Grazing Allotment: Meiss Meadow				Trout Creek Grazing Allotment: Freel and Hell Hole Meadow				Baldwin Grazing Allotment: Baldwin Meadow				Cold Creek Grazing Allotment: Star Meadow			
	#	Kind	on-date	off-date	#	Kind	on-date	off-date	#	Kind	on-date	off-date	#	Kind	on-date	off-date
1965	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1966	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1967	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1968	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1969	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1970	no record available				31	cattle	11-Jul	15-Sep	no record available				no record available			
1971	no record available				non-use				no record available				no record available			
1972	no record available				non-use				no record available				no record available			
1973	no record available				non-use				no record available				no record available			
1974	no record available				non-use				no record available				no record available			
1975	no record available				non-use				no record available				no record available			
1976	no record available				non-use				no record available				no record available			
1977	no record available				non-use				no record available				no record available			
1978	no record available				non-use				no record available				no record available			
1979	no record available				94	cattle	11-Jul	15-Sep	no record available				no record available			
1980	no record available				0	NA	NA	NA	no record available				no record available			
1981	no record available				74	cattle	11-Jul	15-Sep	no record available				no record available			
1982	94	cattle	27-Jul	10-Oct	74	cattle	7-Aug	3-Oct	no record available				no record available			
1983	125	cattle	16-Jul	10-Oct	non-use				no record available				no record available			
1984	125	cattle	16-Jul	10-Oct	74	cattle	11-Jul	15-Sep	no record available				no record available			
1985	125	cattle	7-Jul	10-Oct	80	cattle	11-Jul	15-Sep	no record available				no record available			
1986	125	cattle	29-Jun	10-Oct	60	cattle	4-Aug	1-Oct	no record available				20	cattle	15-Jul	15-Oct
1987	125	cattle	26-Jun	10-Oct	45	cattle	15-Jul	1-Oct	50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct

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	Meiss Grazing Allotment: Meiss Meadow				Trout Creek Grazing Allotment: Freel and Hell Hole Meadow				Baldwin Grazing Allotment: Baldwin Meadow				Cold Creek Grazing Allotment: Star Meadow			
1988	125	cattle	16-Jul	10-Oct	non-use				50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct
1989	125	cattle	16-Jul	10-Oct	non-use				50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct
1990	125	cattle	16-Jul	10-Oct	non-use				50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct
1991	125	cattle	16-Jul	10-Oct	60	cattle	11-Jul	15-Sep	50	horse/mule	1-Jul	1-Nov	20	cattle	15-Jul	15-Oct
1992	65	cattle	1-Jul	2-Oct	non-use				50	horse/mule	15-Jun	1-Nov	20	cattle	15-Jul	15-Oct
1993	100	cattle	1-Jul	6-Oct	non-use				50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct
1994	100	cattle	1-Jul	25-Sep	60	cattle	11-Jul	15-Sep	50	horse/mule	1-Jul	1-Dec	20	cattle	15-Jul	15-Oct
1995	non-use				non-use				50	horse/mule	1-Jul	23-Dec	20	cattle	15-Jul	15-Oct
1996	100	cattle	1-Jul	25-Sep	60	cattle	22-Jul	1-Oct	50	horse/mule	1-Jul	15-Nov	20	cattle	15-Jul	15-Oct
1997	100	cattle	1-Jul	25-Sep	non-use				50	horse/mule	27-Jun	1-Nov	20	cattle	15-Jul	15-Oct
1998	non-use				non-use				50	horse/mule	1-Jul	1-Nov	20	cattle	15-Jul	15-Oct
1999	100	cattle	1-Jul	25-Sep	non-use				50	horse/mule	1-Jul	1-Nov	20	cattle	15-Jul	15-Oct
2000	100	cattle	1-Jul	25-Sep	non-use				50	horse/mule	1-Jul	1-Nov	20	cattle	15-Jul	15-Oct
2001	50	cattle	6-Aug	25-Sep	non-use				50	horse/mule	1-Jul	15-Oct	20	cattle	15-Jul	15-Oct
2002	Vacant				non-use				50	horse/mule	1-Jul	11-Sep	20	cattle	15-Jul	15-Oct
2003	Vacant				non-use				50	horse/mule	1-Jul	1-Nov	Vacant			
2004	Vacant				non-use				45	horse/mule	1-Jul	15-Oct	Vacant			
2005	Vacant				non-use				45	horse/mule	1-Jul	1-Nov	Vacant			
2006	Vacant				non-use				45	horse/mule	1-Jul	1-Nov	Vacant			
2007	Vacant				non-use				30	horse/mule	1-Jul	8-Jul	Vacant			
2008	Vacant				non-use				30	horse/mule	1-Jul	8-Jul	Vacant			
2009	Vacant				non-use				closed				Vacant			
2010	Vacant				non-use				closed				Vacant			
2011	Vacant				non-use				closed				Vacant			
2012	Vacant				Vacant				closed				Vacant			
2013	Vacant				Vacant				closed				Vacant			
2014	Vacant				Vacant				closed				Vacant			

Appendix G: Glossary

Broadcast burn: Prescribed burning activity where fire is applied generally to most or all of an area within well-defined boundaries for reduction of fuel hazard, as a resource management treatment, or both.

Graminoid: Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes).

Girdled: is the complete removal of a strip of bark (consisting of cork cambium, phloem, cambium and sometimes going into the xylem) from around the entire circumference of either a branch or trunk of a woody plant. Girdling results in the death of wood tissues above the damage. A branch completely girdled will fail and when the main trunk of a tree is girdled, the entire tree will die, if it cannot regrow from above to bridge the wound.

Head cut: erosional feature of some streams where an abrupt vertical drop in the stream bed occurs.

Fire intensity: (include difference between low, moderate, high): The rate of energy or heat release per unit length of fire front, regardless of its depth. Low Severity fire is characterized by minimal, short-term ecosystem effects. Soils are not heated, and overstory vegetation is rarely affected. The result of a low-severity fire is fuel reduction and top kill of understory vegetation. Moderate Severity Fire causes moderate soil heating where litter is consumed and duff is charred or consumed, but the underlying mineral soil is not visibly altered. High Severity fire is expressed by complete fuel consumption and extensive soil heating, and usually more than 70 percent top-kill of vegetation.

Perennial channel: is a stream or river (channel) that has continuous flow in parts of its stream bed all year round during years of normal rainfall.

Wet line: A line of water, or water and chemical retardant, sprayed along the ground, and which serves as a temporary control line from which to ignite or stop a low-intensity fire.

Handline: Fireline constructed with hand tools.

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