# Mutton Mountains Restoration

Wildlife


# Project Assessment

**August 12, 2025**

## Table of Contents

# Chapter 1
## Purpose and Need for Action

The Confederated Tribes of Warm Springs, Wildlife Department, is proposing to implement a restoration project within the Mutton Mountains region of the Reservation. Project objectives are to:

1. Increase the vigor and abundance of native plants
2. Provide alternative water sources for wildlife in an arid high-desert environment
3. Reduce road access to protect native ungulates during sensitive times of the year

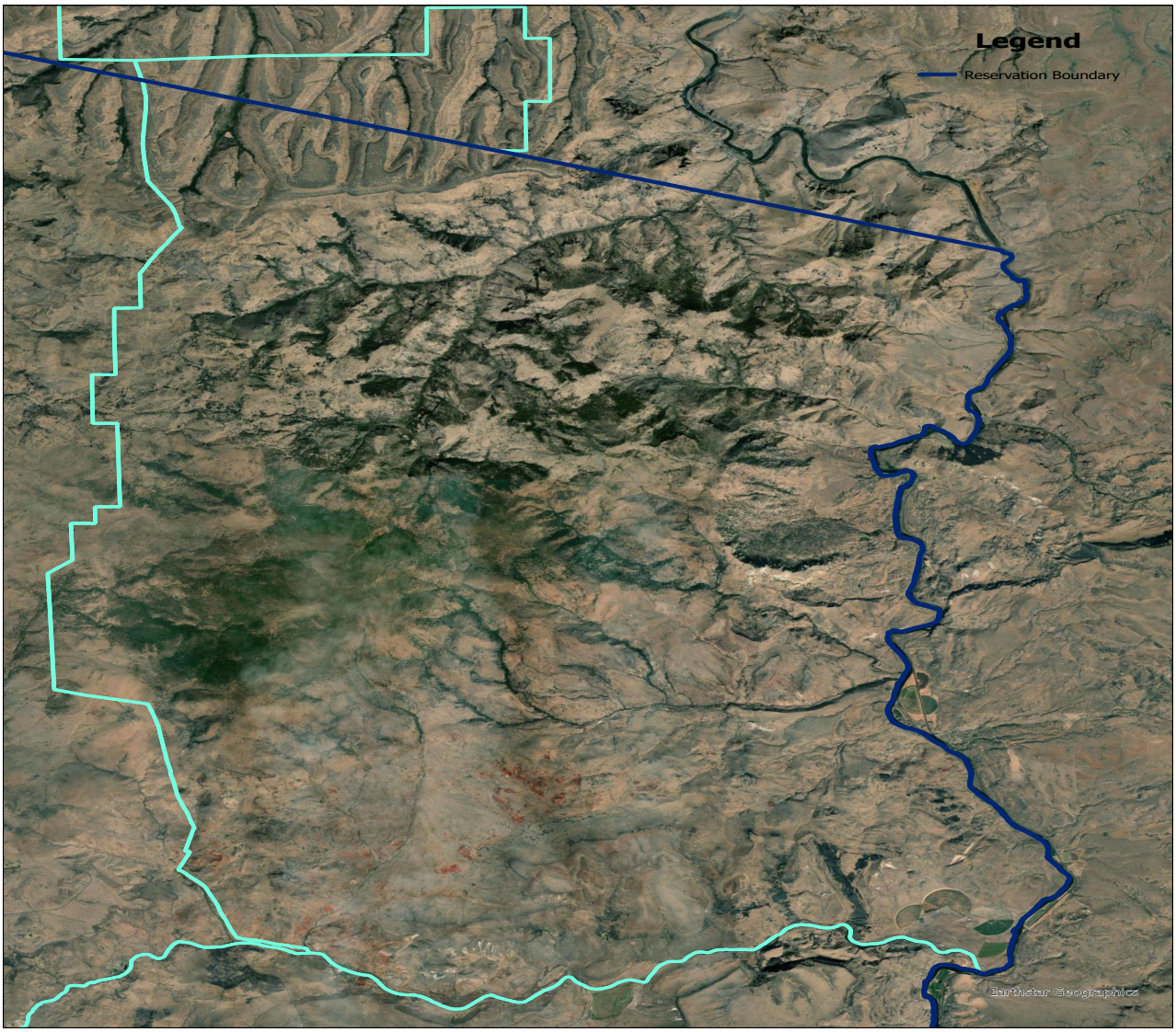


**Figure 1.** Mutton Mountain Grazing District Boundary

The Mutton Mountain region of the Confederated Tribes of Warm Springs Reservation of Oregon (CTWSRO) exhibits a high ecological diversity seldom found elsewhere. The area hosts an expanding bighorn sheep population, elk, mule deer, feral horses, native pollinators, raptors, and a whole suite of meso-carnivores and apex predators. The expansive sagebrush flats

occasionally give way to oak savannahs, aspen groves, and higher elevation mixed conifer species, such as Douglas-fir and Ponderosa pine. With such a varied ecosystem, biologists for the CTWSRO were tasked with developing a restoration plan that incorporated a multitude of different techniques and actions, to best match each ecotype. For this reason, cultural and prescribed burning, herbicide application, forb and grass reseeding, riparian shrub planting, guzzler placement, district fence repair, feral horse removal, seasonal road closures, raod improvements, and juniper thinning treatments are all proposed.

The 2024 Range Monitoring Report shows that all three Mutton Mountain plots surveyed to be in poor condition with "intensive horse use" frequently noted. All plots suffered a more than doubling of invasive annual grass cover between 2012 and 2024. Only one plot supported a simultaneous, but slight, expansion of native bunchgrasses.

With an increase in invasive annual weeds, comes an increase in the intensity and frequency of wildfire. The Mutton Mountains host a diverse overstory of aspen, oak, and conifer species that beneficially contribute to both winter and summer range for native ungulates. Likewise, a varied shrub and bunchgrass component also exists. A loss of these resources to stand-replacing fire would be catastrophic to faunal populations in this region. Also of high ecological and cultural value is the Tule Lake area. An important traditional gathering site, the tules present in this wetland benefit from repetitive, low severity fire. The last time this area was burned was 2022. A high severity fire could result in the decline of this invaluable community, however a prescribed low severity burn will result in a more resilient landscape overall.

Although prescribed fire is instrumental in some areas, it is unsafe to use in others. Vastly steep and rugged, the terrain in this region makes fire fighting dangerous in some locations. In these environments, biologists are proposing to take to the air, utilizing an aerial herbicide application technique. Application, if approved, will be conducted more than a half mile from any perennial water source and will avoid slopes steep enough to facilitate high run-off potential.

Juniper encroachment also serves as a stressor for the overstory. Competing for water, sunlight, and soil nutrients, juniper are beginning to outcompete more limited resources such as oaks and aspen. Although beneficial as thermal cover in extreme winter or summer conditions, juniper hold little nutritional value. Oaks provide thermal protection in the summer months and protein-packed acorns in the fall. The sugars in the bark of aspen provide important winter nutrition when other forage is scarce. Although the vast majority of juniper in the Mutton Mountains will be left standing, it is proposed to remove these trees from areas where they are leading to the decline of aspen and oaks.

A combination of a warming climate, increased use with an expanding horse population, and the trampling of spring sites has led to a reduction in surface water within the Mutton Mountains. With an estimated 1,000 horses on a grazing district that can only support a total of 480 AUMs, interspecific competition for limited quality forage and available surface water is at a critical threshold. Biologists reviewed mule deer, elk, and bighorn sheep data to determine the most beneficial placements for artificial water collection devices (guzzlers). These guzzlers are designed to sit low to the ground, ensuring that all animals from rabbits and bats to lambs and fawns will have access to this limited resource. Additionally, a developed spring near Tule Lake is providing water to a trough. The trough is frequently full and often over-flowing, washing

away the soil around its base. Because of this erosion, the edge of the trough sits about four feet high. Although good for horses and cattle, most wildlife are not large enough to access the water. The Wildlife crew is proposing to replace the trough and repair the overflow, so that water can be accessed by smaller statured animals.

Denuded vegetation and the resulting loss of root systems capable of holding water near the soil surface also contribute to the reduction of available water, as well as top soil run-off, and elevated water temperatures. Areas of highly concentrated perennial water have been identified and are proposed for revegetation. Here, riparian shrubs and trees will be replanted and caged to reduce browsing by livestock and native ungulates. A species list of cottonwoods, aspen, willow, dogwood, chokecherry, and serviceberry has been developed.

Because of its varied and abundant wildlife, trespassing and poaching are common in the Mutton Mountains. Biologists are proposing a seasonal gate be installed on the S-300 road, limiting access during sensitive breeding and rearing seasons for elk and mule deer. The closing and opening of this gate will reflect the times designated by other seasonal gate closures around the Reservation (December 1st- April 1st).

*Communities At Risk*:
There are numerous springs and seeps clustered around the project area that provide clean, cold water to fish-bearing rivers and streams, while creating unique groundwater-dependent habitats. Springs are also important sources of drinking water for livestock and wildlife. Overuse by livestock damages the springs and degrades water quality.

Western juniper (*Juniperus occidentalis*) competes with native vegetation for water, space, sunlight, and available soil nutrients. Western juniper encroachment and its eventual dominance, negatively impact site productivity, biological diversity, wildlife habitat quality, and forage value. Juniper removal will have a wide range of effects on biotic and abiotic indicators as well as our stated goals and desired conditions for the Mutton Mountains.

Oregon white oak (*Quercus garryana*) and aspen stands represent important plant communities within the Mutton Mountain region. Oregon white oak and aspen are used by an abundance of mammals, birds, reptiles, amphibians and invertebrates, but specifically provide important forage for deer and elk. Oak and aspen stands within this subwatershed are declining due to conifers competing for light in the overstory and invasive annual grasses affecting seed germination in the understory.

There are many areas within the Mutton Mountains that are lacking riparian vegetation. The lack of vegetation is primarily due to feral livestock overuse. Riparian vegetation is critical for reducing sedimentation into streams, provides shade for aquatic species, and is valuable cover and forage for birds and other wildlife.

*Project Implementation*

The project would begin implementation in September, 2025, if approved. It is the goal of the Wildlife crew to accomplish the installation of a seasonal gate, the thinning of Skookum Creek, the removal of 250 horses, riparian restoration, and the installation of the trough and guzzlers by October of 2025. The aerial application is proposed for the month of September, 2025. Because of the large footprint of the prescribed burn, it is expected that completion of this step will be phased throughout multiple years. However, timing and season of burning are wholly dependent upon the availability and needs of the Fire crew. Timelines are an estimation and subject to modification based on weather conditions, material availability, and contract and funding availability. The project will take place on tribally owned land. There are six Tribally owned allotments within the project boundary and one fee land plot that is adjacent.

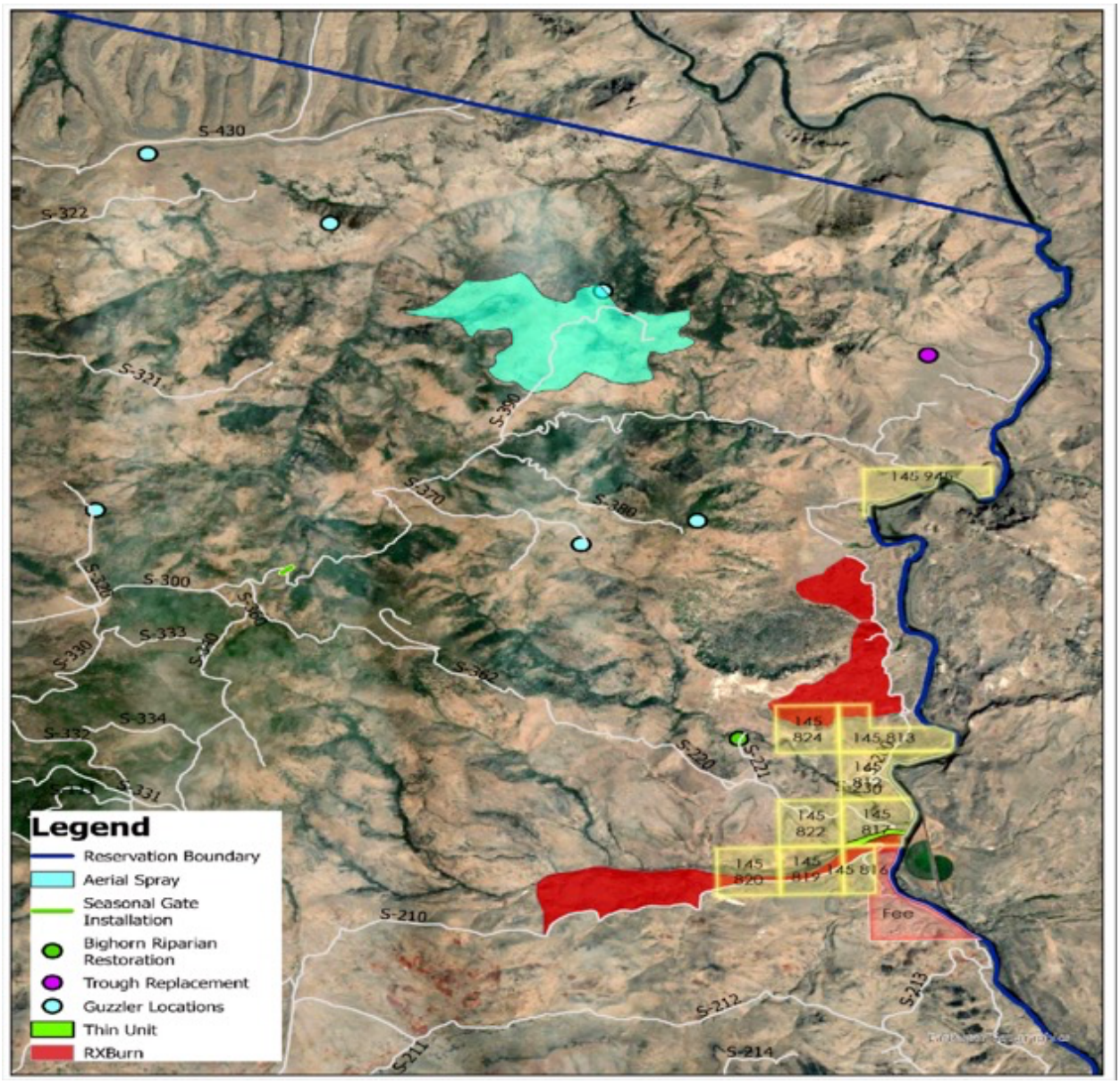

Figure 2: Land Ownership within Project Area

The project assessment is not a decision document. It provides a summary of the Project Interdisciplinary Team's (PIDT) detailed analyses, which are on file in the corresponding departments. The summary offers alternatives for implementing the project and explains the probable effects of each alternative. Alternative A accounts for the "no action" approach, while Alternative B represents a "balanced" approach required under the Integrated Resources Management Plan (IRMP). Acting on information contained in the final project assessment, the Resource Management Interdisciplinary Team (RMIDT) will review the assessment and take comments from the tribal public, before producing a decision document that will be submitted to Tribal Council or their designee for approval.

# Public Review and Comment

Public meetings for the Mutton Mountains Restoration Project were held on April 17, 2025 at the Greely Heights Community Center. The project received community support and the recommendations were incorporated into the design of the project.

# Chapter 2
## Project Alternatives
This section provides an explanation of the two alternatives representing reasonable choices for the Mutton Mountains Restoration Project. It describes the steps necessary to implement the action alternative, methodologies, and affected resources. This section also presents a table showing the existing condition and the effects of each alternative (Table 2) and the recommended alternative.

## Alternative A – No Action
The emphasis of this alternative would be to maintain the area's status as it exists at the present time. This alternative perpetuates the current condition of the Coyote Creek subwatershed. Wetland, meadow and forest habitats would remain impaired.

## Alternative B
Alternative B proposes to improve the ecological condition of the Mutton Mountains through the varied prescriptions listed below:

1. Remove 250 horses
2. Aerial herbicide application on 972 acres
3. Riparian restoration of 10 acres
4. Install six guzzlers and one trough
5. Juniper removal on 20 acres along Skookum Creek
6. Seasonal gate installation on the S-300 road
7. Road improvements on the S-200
8. District fencing repair
9. Prescribed burning of 1,000 acres
10. Reseeding of 100 acres of the prescribed burn
11. 5 years of post-treatment monitoring

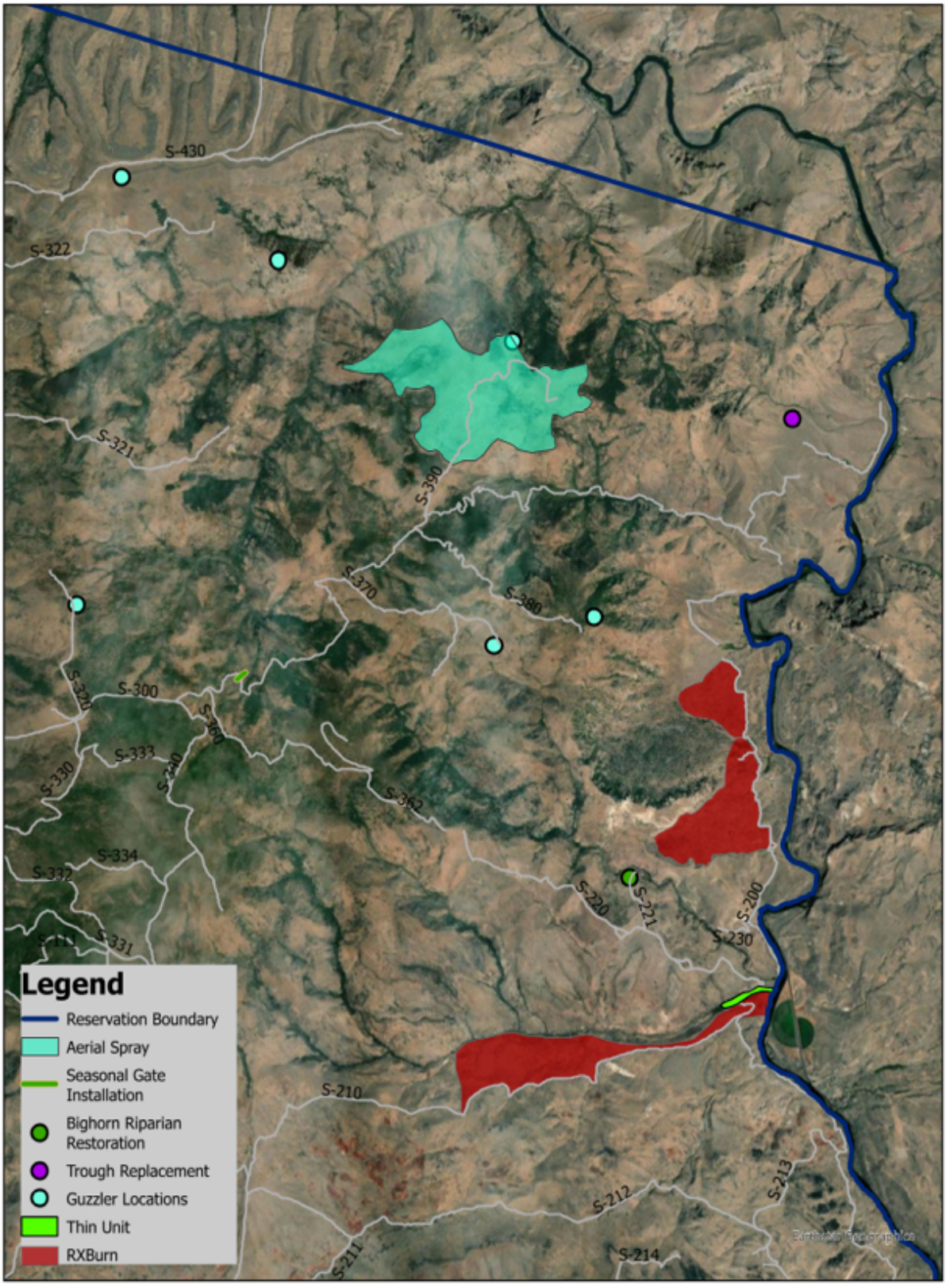


**Figure 3.** Mutton Mountains Restoration Project Elements.

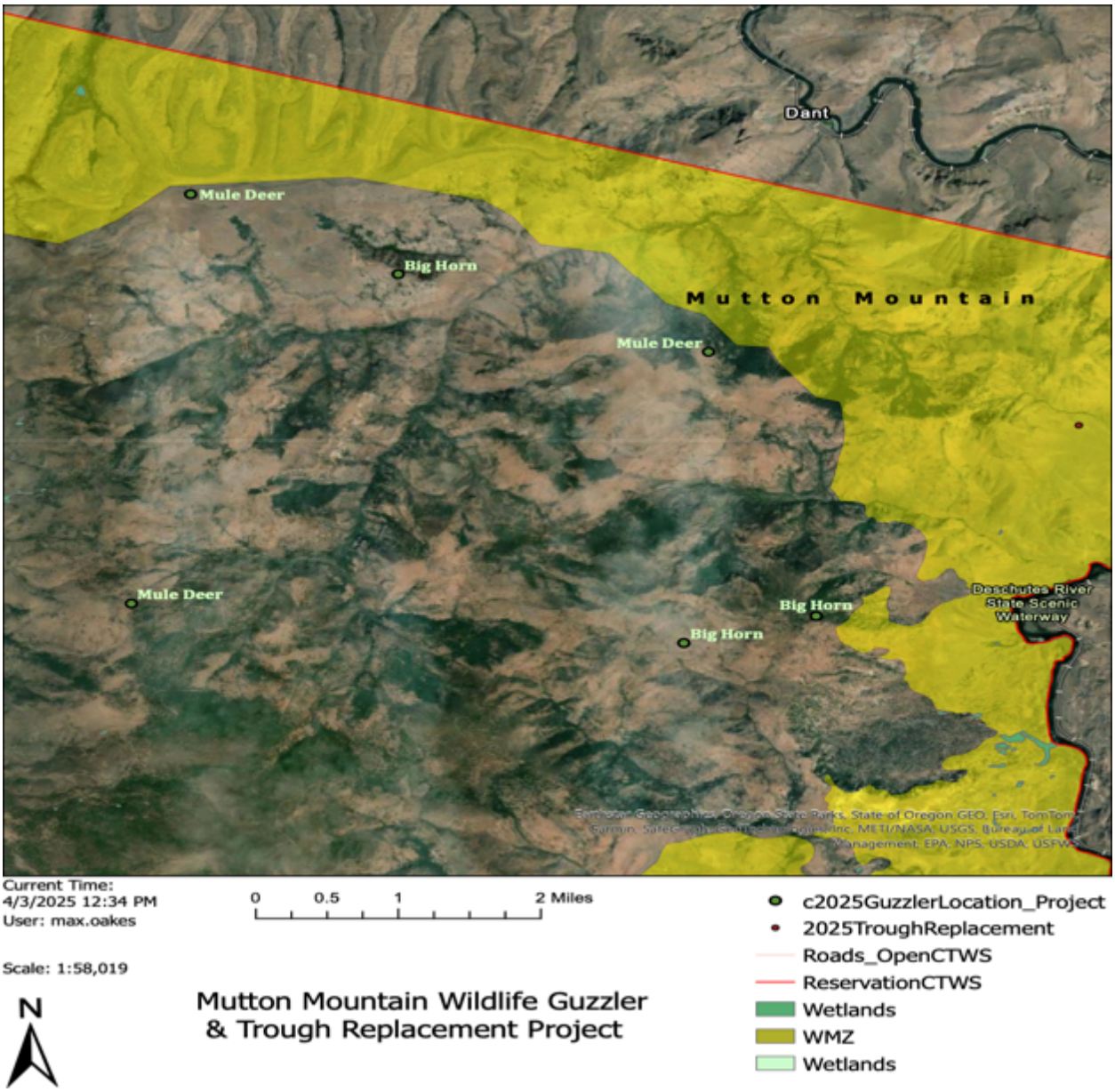

Figure 4: Species specific guzzler installations

**Horse Removal:** The project seeks to remove 250 feral horses from the Mutton Mountains grazing district in 2025. A continuation of efforts from 2024 that saw 150 horses removed from the district, a 2025 contract with a local rancher assigned to the Mutton Mountains grazing district has been initiated. Carrying capacity for the district is 480 AUMs, and supports both cattle and horses. Horse counts performed in 2023 saw 837 horses on the landscape. It is estimated that horse populations grow at around 20% per year, leading to a total potential count of 1,205 horses for 2025. This is 725 head of livestock over the carrying capacity of the district, without including cattle. Future horse removals will continue in subsequent years to bring numbers below carrying capacity.

**Aerial Herbicide Application:** The project seeks to apply a mix of Plateau and Rejuvra herbicide over approximately 972 acres utilizing a fixed wing or helicopter aircraft. The mix will

include 5 oz per acre of Rejuvra, 6 oz per acre of Plateau, and 16 oz per acre of the adjuvant Grounded, a mineral oil designed to increase the weight of the herbicide droplets and reduce airborne drift. Herbicide will be applied between October 23rd and November 1st, to ensure no hunters are inadvertently on site during the time of application. Signage will be installed in the area to ensure hunters and root diggers are aware of the treatment. The labels for the herbicides and deposition agent occur in Appendix A, complete with a list of affected species. The Culture and Heritage Committee was consulted and notified of the effects to the species listed before the submission of this Project Assessment. Rejuvra has proven harmful to aquatic invertebrates and fish. To avoid runoff into water ways, the CTWS Weed Management Plan states that herbicide may not be applied within 300 ft of any class 1, 2, or 3 stream (Appendix B). The project area lies 1,400 ft from Antoken Creek and 1,500 ft from Eagle Creek and all slopes greater than 30% have been removed from the project boundary.

The aerial spray footprint will be monitored once a year for the next five years. A pre-treatment assessment has already been completed, with several monitoring plots, both inside and outside of the spray footprint, established. Medusahead (*Taeniatherum caput-medusae*), cheatgrass (*Bromus tectorum*), and ventenata (*Ventenata dubia*) are the primary target species for removal. If after two years it appears the spray footprint could benefit from a reseeding effort, one will be initiated in 2027.

**Riparian Restoration:** A perennial pond occurs adjacent to lambing habitat on the S-221 road. A ten acre juniper thin will take place surrounding the pond, replacing the juniper with riparian shrubs. The species list for replanting includes: red osier dogwood, cotton wood, aspen, chokecherry, and willow. All plantings will be caged to reduce herbivory. Caging will be removed within three years after project completion, once plantings have had a chance to establish. A riparian seed mix including grasses such as: bluebunch wheatgrass, blue wildrye, and Idaho fescue will be dispersed at 8 lbs per acre. A forb mix including: western yarrow, cushion buckwheat, and woolly sunflower will be dispersed at a rate of 2 lbs per acre. The species mix was selected upon nutritional benefit to does and ewes during parturition.

Skookum Creek hosts both aspen and oaks in its riparian corridor, providing fantastic winter forage for a multitude of species. This area is being inundated with juniper that have begun to outcompete the deciduous species. The Wildlife crew is requesting permission to thin juniper out of 20 acres of the Skookum Creek riparian corridor, repairing any damage that may occur to the riparian fencing during the course of this work.

**Water:** Six locations have been selected to install guzzlers. Three sites occur adjacent to lambing habitat and overlap with mule deer critical summer range. These guzzlers have a low profile and do not require excavation to install. They stand only 20 inches high, allowing access to fawns and lambs, as well as taller statured animals. Unfortunately, the drink basin for these smaller guzzlers would prevent mature rams from drinking, due to the large circumference of their horns. For this reason, three additional sites were selected where bachelor groups are often noted. These larger guzzlers have a taller profile, requiring excavation or an earthen ramp to be constructed to ensure that all animals can reach the water.

The trough of a developed spring north of Tule Lake also stands too tall for many animals to access. The overflow from the trough has begun to wash away the soil underneath, effectively causing the edge of the trough to stand around four feet high. The Range department has suggested that an additional trough to catch overflow may be the best solution to this problem.

**District Fencing Repair:** Grazers within the Mutton Mountain district have requested the repair of the boundary fencing between the Simnasho and Muttons districts.

**Road Closures and Improvements:** The Mutton Mountains contain substantial populations of deer, elk, and bighorn sheep during fawning/calving/lambing seasons for all three species. For this reason, Wildlife is proposing to install a gate on the S300 road to limit access to foot traffic only during these sensitive times of the year. The gate will match the seasonal closures in other areas of the Reservation and will remain closed from December 1st to April 1st.

The S-200 road offers access along the Deschutes River to the historic Hardy Cabin. This road is utilized frequently be Tribal recreationalist who fish, hunt, and float this stretch of river. There are sections of the S-200 that will soon be rendered impassable by vehicle traffic is improvements are not made.

**Prescribed Burning:** The Wildlife department is proposing a 1,000 acre prescribed burn, to help reduce the potential for severe wildfire in the future. This large footprint includes the Tule Lake area, incorporating cultural burning into the larger plan. Tule Lake was burned previously in 2022 and saw a positive response from the tules. After the completion of the burn, a drone will be utilized to determine the most beneficial 100 acres to reseed.

# Comparison of Alternatives

**Table 2.** Comparison of Alternatives

| Activity | Alternative A | Alternative B |
|---|---|---|
| Acres of wetland/meadow/riparian habitat restored | 0 | 30 |
| Herbicide treated acres | 0 | 972 |
| Number of water developments | 0 | 6 |
| Number of trough repairs | 0 | 1 |
| Number of seasonal road restrictions | 0 | 1 |
| Number of horses removed | 0 | 250 |
| Acres of prescribed burning | 0 | 1,000 |
| Acres reseeded | 0 | 110 |
| Miles of fence repaired | 0 | 15 |

# Monitoring

Monitoring will take place for five years post-treatment to determine project effectiveness. Techniques such as vegetation transects, photopoint monitoring and wildlife inventories will be conducted within the project area pre- and post-implementation. A contractor will be hired to conduct more intensive vegetation monitoring yearly, with a emphasized focus on cultural plant response. An Oregon State University lab will be contracted to perform analysis on how long the residual plant matter retains the herbicide, giving biologists a better idea of when root gatherers can resume collecting plants in the area.

# Partnerships

Partnerships and funding include: the Mutton Mountains grazing district, the Wild Sheep Foundation, the Oregon Chapter of the Wild Sheep Foundation, and the East Cascades Oak Partnership. The interdisciplinary team has worked closely and coordinated with the grazing district, and the Land Use, Cultural, and Fish and Wildlife Committees on this project. The grazing district supports the project and provided information that is incorporated into the project design.

# Known Funding Sources

Funding for this project is provided primarily by the 2024 and 2025 sale of the non-Tribal bighorn sheep hunt, facilitated by the Wild Sheep Foundation.

# Recommended Alternative

# Chapter 3
## Affected Environment and Environmental Consequences

This section is broken into nine resource-related subsections arranged in the following order: Water, Fish, Wildlife, Cultural Resources, Forest Vegetation, Fire, Range, Transportation, and Soil.

The Affected Environment write-ups provide the reader with a general overview of conditions that currently exist for each resource within the proposed project area. Resources are assessed with issue indicators including water quality measurements, habitat conditions for wildlife, the presence of cultural plants and archeological sites, and other current conditions. The Affected Environment sections supply baseline information, making it easier to analyze alternatives and their environmental consequences, which are summarized at the end of each subsection.

# Water

The Mutton Mountain region of the Confederated Tribes of Warm Springs Reservation of Oregon (CTWSRO) exhibits a high ecological diversity. Annual precipitation within project areas range from 5-14 inches of water a year. The proposed Mutton Mountains Restoration project encompasses three ephemeral sub-watersheds: Eagle Creek, Oak Creek, and Skookum Creek. During the late winter and early spring months these areas are characterized by runoff flows emptying into the Deschutes River. The project area is further described as an intensive horse use and invasive annual weed area and a high ecological and cultural value is put on the Tule Lake area. A combination of a warming climate, increased use with expanding horse population, (1,000 horses grazing on 480 AUMs) and high competition for limited quality forage and available water sources is at a critical threshold. Many areas within the Mutton Mountains are lacking riparian vegetation.

# Alternative A

This alternative would maintain the downward ecological trajectory of the project area. Eroding, incised stream channels would persist and the volume of fine sediments in the project areas would remain unchanged, or potentially increase over time. Invasive annual grasses will continue to dominate the uplands and junipers will multiply creating most harm in the riparian zones as they pull available water from the creek and underground reservoirs. Spring developments will continue to deteriorate as livestock and an ever-increasing population of horses will trample spring sources, reducing flows and compromising water quality and availability.

## Alternative B

Restoration actions under this alternative have the potential to increase ecological functions in the project area and riparian zones. All proposed activities should reduce retention of fine sediment inputs into all ephemeral water bodies. Further, the removal of 250 feral horses will benefit water and riparian resources in the project area. Prescription burns proposed is not expected to cause any impacts to water resources. The aerial herbicide treatment in fall of 2025 will happen when ephemeral channels will be dry and conditions (distance from streams) for herbicide treatment outlined in the proposal will minimize the probability of potential harmful herbicide runoff. Because of the wilderness nature of this environment, it is feasible to encourage the vitality of native vegetation and bunchgrasses while limiting the expansion of invasive annuals. The implementation of these alternatives will reduce the risk of displacement of native species by invasive species, improve water quality and availability, and protect against continued encroachment and habitat deterioration. Restoration actions under this alternative have the potential to increase ecological functions in the project area.

# Fish

The proposed Mutton Mountains Restoration project encompasses three ephemeral sub-watersheds: Eagle Creek, Oak Creek, and Skookum Creek. These creeks are all tributaries to the lower Deschutes River.

The proposed aerial herbicide treatment overlaps with the Eagle Creek sub-watershed. During the late winter and early spring months, Eagle Creek is charged by runoff and flows continuously to its confluence with the Deschutes River. Decreased runoff in the summer and fall months causes much of the Eagle Creek channel to desiccate, although small, patchy pools of water may persist perennially. Steelhead (i.e., anadromous *Oncorhynchus mykiss*) spawn during the late winter and early spring months in Eagle Creek, and Fisheries Department staff monitor steelhead redd (i.e., spawning nest) counts through spawning ground surveys. Steelhead redd counts in Eagle Creek have declined since 2017. No redds were observed in Eagle Creek in 2023 and Fisheries Department staff were unable to survey here in 2024. Redband trout (i.e., resident *O. mykiss*) may also persist in Eagle Creek in isolated patches of perennial water.

The southern margins of the northernmost prescribed burn polygon are close to the Oak Creek sub-watershed. No endemic fish species are known to persist in this ephemeral creek.

The southern prescribed burn polygon lies within the Skookum Creek sub-watershed, and juniper thinning is proposed to occur in the Skookum Creek riparian zone. The hydrologic profile of Skookum Creek is similar to that of Eagle Creek. A limited number of steelhead spawn in Skookum Creek during the late winter and early spring months, and Fisheries Department staff monitor steelhead redd counts through annual spawning ground surveys. No redds were observed in this sub-basin in 2023 or 2024 and annual redd counts have generally declined over the past decade. Redband trout may persist in Skookum Creek in isolated patches of perennial water.

## Alternative A

This alternative would maintain the downward ecological trajectory of the project area. Eroding, incised stream channels would persist and the volume of fine sediments in Skookum Creek would remain unchanged, or potentially increase over time. Such conditions would likely continue to limit the number of spawning adult steelhead and the survival rate of steelhead fry in Skookum Creek. In addition, an opportunity to invest in restoration actions that benefit a suite of endemic flora and fauna on the Reservation would be lost.

## Alternative B

Restoration actions under this alternative have the potential to increase ecological functions in the project area. Proposed riparian zone work and juniper thinning may reduce retention of fine sediment inputs into Skookum Creek, which would improve the survival of steelhead fry and spawning conditions for adults. Deleterious impacts that feral horses incur on instream and riparian habitat are well-documented and may include decreased bank stability, decreased riparian canopy cover, and increased fine sediment deposits into instream zones. Accordingly, the removal of 250 feral horses may benefit fisheries resources in the project area. Broadly, these two components of the proposed work have the potential to positively impact fisheries resources in the Skookum Creek sub-watershed and the broader Mutton Mountains ecoregion.
Because wildfires and prescription burns can cause short-lived but significant stream temperature increases, the proposed Skookum Creek prescription burn should not occur in March or April when adult steelhead may be spawning in the creek. The northernmost proposed prescription burn is not expected to cause any impacts to fisheries resources. The aerial herbicide treatment, which lies within the Eagle Creek sub-watershed, is slated to occur in fall of 2025. From a fisheries resources perspective, the fall months are an ideal time period for the herbicide application to occur because much of the Eagle Creek channel will be dry and adult steelhead will not be present in the area. The conditions for herbicide treatment outlined in the proposal (i.e., no herbicide treatment within 300 feet of creek beds, herbicide application can only occur on a day with low wind speeds) will minimize the probability of potential redband trout exposure to harmful herbicide runoff.

# Wildlife

A variety of birds, mammals, reptiles and amphibians may be found in the Skookum, Eagle and Antoken subwatersheds of the Mutton Mountain range. Wildlife distribution and abundance depends greatly upon an ecosystem's physical characteristics such as soil, water, vegetation, topography, elevation and climate. Other key factors influencing wildlife populations are competition for food and space, human disturbance, predation and disease. The quantity and quality of suitable habitat will have the most significant long-term influence on wildlife populations. Factors such as the abundance of cover, forage, prey, water availability and road densities are critically important to the perpetuity of wildlife populations.

Meadows, wetlands, and riparian areas provide important habitat for many species of wildlife. These ecosystems provide year-round habitat for mammals, amphibians, reptiles and resident birds as well as breeding sites, wintering areas and stopover habitats for migratory birds. They provide water, hiding and thermal cover, a rich and diverse source of forage and prey, travel corridors and refuge from unfavorable weather conditions. Riparian zones are favored foraging

habitat for deer and elk, and provide travel corridors and relief during hot weather. Among larger mammals and carnivores, otters, beavers, minks, raccoons, weasels, bears and foxes depend heavily on riparian habitat. Additionally, wetlands and riparian zones provide a rich prey base of small mammals, fish and carrion consumed by birds such as bald eagles, osprey and other raptors. Dense populations of songbirds and bats may also be found within riparian areas due to the large abundance of insects and dense cover.

Oak habitats provide excellent cover and forage for many species of wildlife. Acorns, as well as other native vegetation found in oak habitats, are eaten by a variety of wildlife and are particularly important in the winter when other foods are scarce. These habitats are currently at risk of encroachment by conifer within the project area.

Current and historical telemetry studies have been conducted by the CTWS to document residential and migratory use by elk and deer throughout the year. Wildlife habitat use is often related to the quality of habitat, cover and water availability. The influence of forage availability on habitat effectiveness is a function of the quantity and quality of the aboveground biomass available on key forage species. Unique habitats such as riparian areas, wetlands, and meadows are extremely important to wildlife.

Current landscape conditions in the Skookum, Eagle and Antoken subwatersheds have largely influenced the status of wildlife populations. According to recent surveys and studies conducted by the Wildlife Department on the Reservation, the project site and surrounding area is very important to deer and elk. Deer and elk populations have dramatically declined over the past 30 years on the Reservation. Although populations have declined over the decades, these areas continue to hold on as strongholds despite impacts from drought and fire. 2017 saw the last major fire, the Nena fire, in the area. The mix of severity of both high and low showed the need for low intensity fire and its potential benefits, and why efforts to reduce current overstocking of conifers and reduction in invasive annual grasses is greatly needed.

Heavy livestock grazing has degraded the forage quality in many of the grasslands, meadows and wetlands. The current composition of the overstory consists of primarily of Ponderosa Pine and minorly of Doug-Fir, with Oregon White Oak seen in higher densities amongst the higher clay soils. Juniper has continued to encroach into these areas as a result of both fire suppression and a severe increase in fire intensity and severity over the past 40 years. While strong patches of native perennial bunchgrasses such as western and Idaho fescue remain intact, with strong shrub cover of antelope bitter brush, rose, and big sagebrush within the riparian of the Deschutes, degrading abundances as a result of overgrazing and fire have pushed these pockets into smaller and smaller footprints throughout the Mutton Mountain range. Although there is a large composition of annual grasses, the oak habitats remain in moderate condition. There are still good communities of native grasses and forbs in the understory. Encroachment of juniper, fir, pine and incense cedar within oak stands could threaten the future condition of these habitats.

Open road densities within the project area encompassing the Skookum, Eagle and Antoken subwatersheds are 1.96 miles of roads per square mile of habitat. Road densities greatly impact habitat suitability for a variety of wildlife species. Deer and elk are particularly sensitive to human disturbance associated with high road densities. Aside from causing a direct loss of habitat and a direct mortality of wildlife, roads also have indirect impacts to wildlife resources. Roads are a major contributor to habitat fragmentation, as they divide large landscapes into smaller patches and convert interior habitat into edge habitat. Additionally, roads decrease the habitat effectiveness of adjacent habitat, increase noise and disturbance during critical times of the year and increase illegal killing of wildlife.

# Alternative A

Alternative A would leave the Skookum, Eagle and Antoken subwatersheds in its current condition. Habitat would continue to degrade if left untreated. Without active restoration recovery of the meadows, wetlands, riparian habitat and forested habitats, it would take many decades or would likely remain in a degraded state indefinitely.

# Alternative B

Alternative B would have positive impacts to wildlife resources by improving habitat quality and quantity. Reduction of horse populations will improve water quality and storage in the meadows and rangelands and eliminate overgrazing particularly in riparian and native plant communities. This will improve forage availability and quality for wildlife. Releasing oaks from conifer encroachment, through the removal of conifers and burning the understory, will improve oak vigor and likely result in stand expansion. Riparian, wetland and meadow restoration will return the system to proper functionality by restoring floodplain connectivity and controlling sediment erosion, which will prevent future degradation. Protecting spring sources will improve water quality and wetland habitats for wildlife. The subsequent increase in available water through improved trough or guzzler addition will vastly improve access and utilization across the range that was previously inhibited as a result of drought. Seasonal closure of the S-300 network of about 7.81 miles of road will greatly reduce disturbance and human pressure and fire risk on habitats and wildlife populations. The use Rejuvra, while initially reducing forb composition on approximately 977 acres, will lead to improved retention and protection of native intact perennial bunchgrass communities and allow for restoration of those lost forb communities within 2-5 years. Overall, it is anticipated that the effects of the Mutton Mountain restoration project in the Skookum, Eagle and Antoken subwatersheds will be far reaching, improving wildlife habitat conditions on multiple levels within the each subwatershed. The long-term effects of this project are anticipated to increase wildlife populations within and surrounding the project area.

# Cultural Resources

A review of Cultural Resource Department files indicate that 9 cultural resource inventories have been conducted within the Proposed Mutton Mountains Restoration Project. These inventories do not meet current cultural resource inventory standards. Prior inventories have identified a total of 9 cultural properties within the Project as well as various cultural plant species including but not limited to *Balsamorhiza Sagitta* known as Balsamroot Sunflower; *Lamatium cous* knowns as Biscuitroot; *Lewisia Rediviva* known as Bitterroot; *Lomatium canbyl* known as Canbys Desert Parsley; *Lomatium nudicaule* also known as Indian Celery; *Scirupus valludus* known as Tule, *Perideridia gairdneri* also known as Indian Carrot; *Triteleia hyacinthine, White Triteleia* also known as Buttons; *Lomatium grayi* also known as Early Celery (Lattit Lattit), *Sambucus nigra* ssp. cerulean also known as Blue elderberry; *Lomatium nudicaule* also known as Indian Celery; *Apocynum androsaemifolium* also known as Dogbane or Indian Hemp. 1 undocumented pictograph site needing to be documented. Historic maps of the area show old unnamed roads (dirt and "inferior") and 2 trails traversing near the Project, as well as 7 Indian Allotments. The "Old Warm Springs Indian Reservation Boundary" "McQuinn Strip 1887, and Handley Survey 1871" borders the northern portion of the Project.

Cultural resources within the Project have been affected in the past by ground disturbing activities, natural erosion, and fire. These resources should be protected, preserved and managed in a manner consistent with Tribal Ordinance 68, Chapter 490, "Protection and Management of Archaeological, Historical and Cultural Resources" and Section 106 of the National Historic Preservation Act of 1966, as amended. In addition, all cultural resources will be managed under Tribal Ordinance 74, the Integrated Resource Management Plan for the Forested Area.

## Alternative A

Alternative A would not alter the level of impact to areas containing cultural resources, because no changes to the current condition and management of the area are proposed.

## Alternative B

A total of 9 previously documented, and 1 undocumented cultural properties are located within the Project planning area. Based on the proposed project activities layout, 7 previously documented cultural properties are located either within or in the immediate vicinity of the Prescribed Burn area, 3 are located either within or in the immediate vicinity of the Skookum Creek Thinning Area. Cultural Plant species are located within or in the immediate vicinity of all project locations. Linear features related to historic trails, roads, or fencelines may be present within a majority of the Project and remains of historic Indian Allotment development activities may be evident within Thinning and prescribed burn of the Project.

The Cultural Resource Department recommends updating site forms to SHPO standards to 9 known previously documented cultural properties, New site documentation of known pictograph site within the Thinning unit, a cultural resource inventory before the prescribed burn ground disturbance activities, survey of the trough replacement ground disturbance activities to include areas not previously surveyed under current cultural resource inventory standards and any areas with activities related to Project mitigation. Cultural plants are identified within or in the immediate areas of the Project, the Cultural Resource Department will work with the Project Leader to creatively mitigate impacts to cultural plants.

# Forest Vegetation

This project is primarily within the rangeland and is outside the commercial forest base. The forested area of the project is primarily small isolated pockets of woodlands less than 30 acres. In general, fuel loads are low and stand vigor and health are typical of a site characterized by shallow soils with minimal water availability.

The woodlands are composed of a mixture of ponderosa pine, Douglas-fir and Oregon white oak with minor component of scattered juniper. Stocking levels within the woodlands are low and an open canopy persists with a dominant understory of cheatgrass. Within the project treatment areas Oregon white oak is predominantly found within the riparian zone of Skookum Creek. These white oaks are mature and healthy with minimal overtopping from conifers within the Skookum Creek riparian zone there is a minor component of junipers encroaching into the oak woodland.

# Alternative A

Since this project is outside the commercial forest no impact is anticipated to the commercial forest ground. Alternative A would not proactively improve growth and vigor of woodland species, or reduce fuel loads.

If no action is taken, juniper encroachment would slowly increase over time within the Skookum Creek riparian zone and the perennial pond located at the end of the S-221rd. This has the potential to increase competition with Oregon white oak and native riparian vegetation. In addition, the continued presence of cheat grass would outcompete native vegetation and increase the presence of fine flashy fuels on the landscape.

# Alternative B

Alternative B would decrease the presence of encroaching junipers within Skookum Creek and the perennial pond located at the end of the S221 road. In addition, planting a mixture of riparian species such as cottonwood, aspen and dogwood should increase shade and improve Bighorn lambing habitat while providing increased bank stabilization.

# Range

Much of the rangeland condition for the Mutton Mountains is rated as *fair* to *poor* due to the dominance of the invasive annual grasses medusahead rye (*Taeniatherum medusa*) and ventenata (*Ventenata dubia*), species that are perpetuated by shortened fire cycles and years of overgrazing of native species by wild horses and livestock. As annual grasses become dominant, native forb and bunchgrass species are unable to capture and utilize available water and nutrients. Consequently, these plants disappear from the landscape as the land is transformed into a monoculture of annual grasses, devoid of the biodiversity needed to support a rich variety of fauna. Tribally significant cultural plants are adversely impacted as well and over time will lose the ability to compete for available water and nutrients.

That being said, there are pockets of healthy native vegetation on steep north-facing slopes and the very remote and rugged higher elevation terrain untrammeled by human contact and vehicle

traffic. Because of the wilderness nature of this environment it is feasible to encourage the vitality of native vegetation and bunchgrasses while limiting the expansion of invasive annuals. Not only is native vegetation critical for wildlife forage and cover, a native bunchgrass system, by its very nature of not being a continuous fuel source, will act as a deterrent for largescale wildfires. Therefore, actions that contribute to protecting this watershed from further degradation is worthwhile.

The ever-increasing presence of horses disrupts the natural balance as bighorn sheep and other ungulates begin to disappear from the landscape, displaced due to the lack of native vegetation. Additionally, water availability for all wildlife is decreased and water quality is denuded due to the trampling of natural springs and streams.

Junipers also exist throughout the unit but appear heavily along the Skookum Creek drainage. While junipers are native, they become invasive due to the detrimental impacts they have to ecological function when they begin to dominate, expanding from their niche environment. To improve understory composition and plant viability, juniper treatment projects should be conducted where there is still a predominance of viable native bunchgrasses, shrubs and, in this case, riparian vegetation. With junipers present, native vegetation becomes severely compromised, as shrubs and deciduous trees are the first to die off followed by deep rooted bunchgrasses and then shallower-rooted forbs and grasses.

The presence of springs and streams are a dynamic feature in this area. Developed springs will protect the spring sources from trampling and degradation and provide clean available water for wildlife, livestock and avian species, while the runoff from the overflow contributes to stream flows. The installation of wildlife guzzlers will additionally help to relieve pressure from spring sources and provide water within the drier reaches.

# Alternative A

No Action. Invasive annual grasses will continue to dominate the uplands and junipers will multiply creating most harm in the riparian zones as they pull available water from the creek and underground reservoirs. These combined factors will continue to degrade native vegetation viability, further reducing biodiversity. Spring developments will continue to deteriorate as livestock and an ever-increasing population of horses will trample spring sources, reducing flows and compromising water quality and availability.

# Alternative B

Proposed Actions include passive and active restoration actions that will directly address resource degradation and preservation while indirectly improving integrity of culturally significant plants.

Spraying the annual grasses in the remote canyon areas with an herbicide targeted for annual grasses should release the native vegetation, providing an opportunity for their expansion and re-colonization without the need for re-seeding. Complete juniper removal within Skookum Creek is recommended including all sapling and pole sized trees.

Ongoing horse removal is recommended to ensure that horses are not displacing bighorn sheep and other ungulates.

The Range Department would like to recommend that Great Basin wildrye (*Leymus cinerius*) be incorporated in the riparian seed mix.

The implementation of these alternatives will reduce the risk of displacement of native species by invasive species, improve water quality and availability, and protect against continued encroachment and habitat deterioration.

# Transportation

Road conditions in the project area vary from fair to poor. Poor conditions are more prevalent when surfaces are wet. The S-300 road is a gravel surface road to the S-320-S-330 junction but beyond that point is a clay native surface road. The S-300 provides the primary access into the project area. The side roads within the project area are composed of an unimproved native surface and are in poor condition. The S-300 is a BIA system road but has only been maintained to provide adequate safe access to the homes. Most of the stream crossings located within the project area are unimproved native surface crossings. Due to the of lack of projects proposed in this area the roads have not been maintained beyond the homes for a number of years.

The objective alternative B would be to provide an improved and maintained safe and economical transportation system.

## Alternative A

Alternative A would not directly result in any changes to existing road conditions. Poor road conditions would persist.

## Alternative B

This alternative would include a valuable opportunity to improve and maintain the S-300 and restore proper drainage to the roadway and ditches beyond what the BIA has provided for the residence in the area. There is no new or reconstruction of road proposed for the project area. Traffic to and from the project area will consist mostly of light duty pick-up trucks, with speeds kept to a minimum, this traffic should have no major adverse effects on the transportation system once the pre-project road maintenance has been performed. Under this alternative, Operational or post project maintenance will be performed as needed.

# Fire

Analysis of the Mutton Mountains Restoration project area utilizes the Interagency Fuels Treatment Decision Support System (IFTDSS) to analyze the associated landscape features and report wildland fire behavior characteristics within the project boundary. IFTDSS incorporates a plethora of fire and fuels software programs to analyze and compute fuels and atmospheric elements to model fire behavior at the 97$^{th}$ percentile conditions within the specified area. The analysis is focused on the project area and reports the analyzed elements in each category

numerically using the metric system providing ratios in percentages across the project area. It's important to note that the landscape attributes that exist across the project area vary spatially in continuity and are not always continuous across the project area.

**Landscape Baseline Elements**

The Mutton Mountains Restoration project ranges from the low-high elevation rangeland area that ranges from 1,100ft elevation to 3,800ft in elevation. 80 percent of the landscape exhibits slopes that range from 5-25 degrees with most slopes being 10-15 degrees and 20 percent being primarily flat. Slope aspects are divided between the North and South quadrants equally with South East and East slope aspects being dominant. An equal distribution between the Grass (GR) and Grass and Shrub (GS) fuel model exists on the landscape. GR1 (Short, sparse dry climate grass), GR2 (low load, dry climate grass coupled with GR1 (low load, dry climate grass-shrub) and GS2 (Moderate load, dry climate grass-shrub) make up the majority of the fuel models present. Canopy cover percentages are low (2%) due to the lack of conifers present. Stand height percentage of conifers present are between 5-12.5 meters. Canopy base heights of the conifers are .5 meters or less where they are present. The project area is mainly within fire regime condition class II, moderately departed from historical conditions.

**Topographic and Fuels Conditions**

South and South East aspects angled at 10-15 degrees experience early and consistent solar heating daily and at a longer duration during the summer months. This rangeland area consist of native grasses and shrubs intermixed with annual and perennial invasive grasses and shrubs that contribute to an increased fuel continuity, hazardous arrangement and higher fuel load that isn't normal when compared to historical fuels conditions. Grass fuels models experience high moisture extinction hourly while shrub fuel models experience moisture extinctions at a 10 hour average depending on the fuel size class. Fuel loads within the grass fuel models average 1.0 tons per acre (t/ac) while the grass shrub fuel models exhibit 2.5 t/ac. Do to increased grass and shrub invasives intermixed with native species, fuel load, arrangement, and continuity is unlike its historical conditions allowing the area to fall within a Fire regime and condition class of 2, moderately departed from historical conditions.

**Fire Behavior**

Fire modeling is based on the 97$^{th}$ percentile conditions which generally means "worst case scenario" related primarily to fuel moistures live and dead as a result of the climactic and landscape conditions analyzed together. Local remote automated weather station(s) (RAWS) compile weather data and compute daily data to generate elemental averages while identifying the time and duration of the elements that contribute to the energy release that predicts wildfire likelihood and intensity. The elements accounted for describe the 97$^{th}$ percentile conditions in the project area and are as follows:

| | | |
|---|---|---|
| **Wind type** – Gridded | **Foliar Moisture** – 100% | **100 Hour Fuel Moisture** – 6% |

| | | |
|---|---|---|
| **Wind Speed** – 20 Mph<br>**Wind Direction** – 0°<br>**Crown Fire Method** – S&B | **1 hour Fuel Moisture** – 3%<br>**10 Hour Fuel Moisture** – 4% | **Herb Fuel Moisture** – 45%<br>**Woody Fuel Moisture** – 91% |

Flame lengths across the project area exhibit a 50-50 split between 1-4 feet and 4-8 feet primarily. Rates of spread are divided with 50% of the landscape averaging 20-50 Chains per hour (ch/hr) and 50% of the landscape experiencing 50-150 ch/hr. Fireline intensities are moderate and range between 100-500 BTU/ft-sec. Heat per unit area across the landscape is rather low and averages 300-1000 Btu/$ft^2$. The landscape would exhibit surface fire largely while passive crown fire amounts to 2% of the total area. Active crown fire across the area is less than 1%.

# Alternative-A (No Action)

Alternative-A would not alter the fuels load, composition, arrangement and/or continuity and the likelihood of moderate fire behavior would pose a challenge to contain with hand crews and heavy equipment.

# Alternative-B (Proposed Action)

Alternative-B would alter the fuels load, composition, arrangement and/or continuity reducing fire spread rates and intensity, allowing on the ground fire suppression efforts to be more effective and safe. By creating more interspace between annual and perennial grass and shrub species, invigorating these species through prescribed fire, fire is less likely to behave expeditiously at intensities that are challenging to contain and damaging to the health and vigor of the area and suppression personnel. Through the use of prescribed burning within the project area, fire resilience on the landscape project area will follow.