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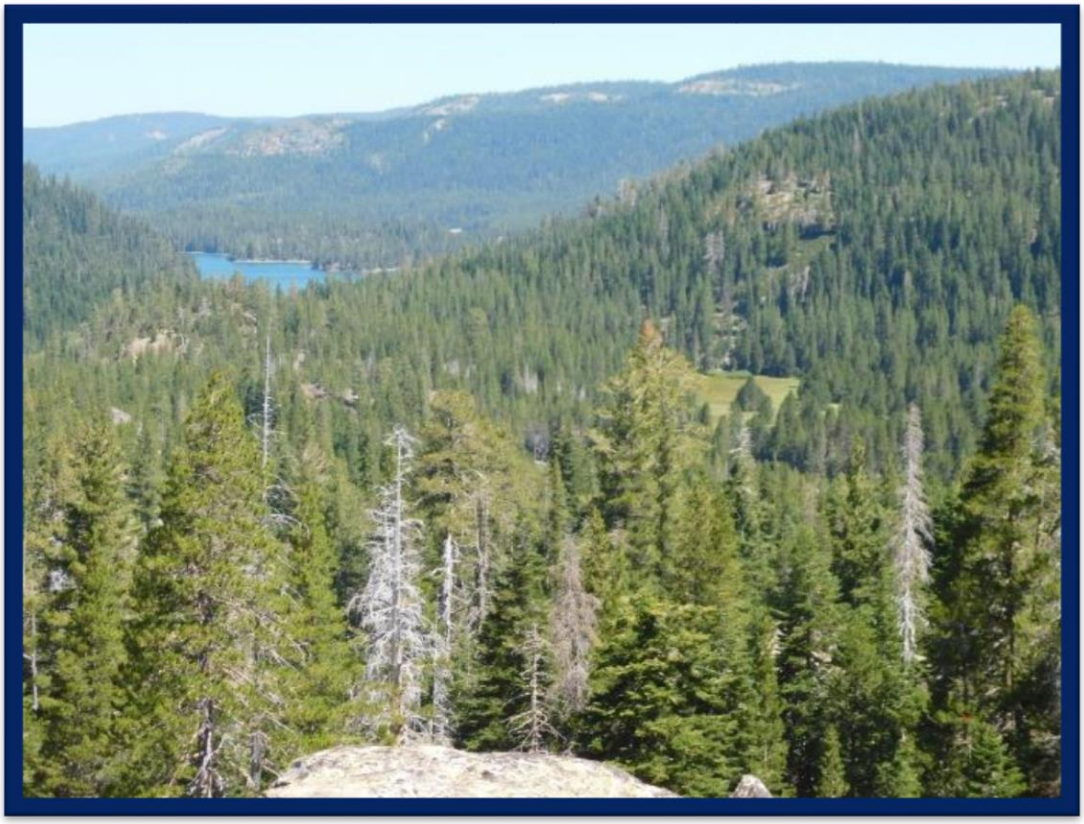

MIDDLE YUBA RIVER HEADWATERS
ENGLISH MEADOW FOREST MANAGEMENT PLAN

Nevada and Sierra Counties, California

Prepared in Partnership By:

Nevada Irrigation District ~ Environmental Resources Division

Under the Trees Inc.
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Sierra Nevada Conservancy Watershed Improvement Program

NID

Property Name: **English Meadow**

Mailing Address: 1036 West Main Street, Grass Valley, CA 94945

Owner Name (s): Nevada Irrigation District

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Acronyms

APN - Assessor's Parcel Number

ATFS - American Tree Farm System

BMP - Best Management Practices

CDF – CAL FIRE Department of Forestry and Fire Protection

CDFA - California Department of Food and Agriculture

CDFW - California Department of Fish and Wildlife

CEQA - California Environmental Quality Act

CESA - California Endangered Species Act

CFIP - California Forest Improvement Program

CFR - Code of Federal Regulations

CNDDB - California Natural Diversity Database

CNDDB - California Natural Diversity Data Base

CNPS - California Native Plant Society

DBH - Diameter-at-breast-height (~4.5 feet above the ground)

FESA - Federal Endangered Species Act

FMP - Forest Management Plan

GHG - Greenhouse Gas

GIS - Geographic Information System

MDB&M - Mount Diablo Base and Meridian

NRCS - Natural Resources Conservation Service

RWQCB - Regional Water Quality Control Board

SCLT - Sierra County Land Trust

STA - Special Treatment Area

TPZ - Timber Production Zone

U.S. - United States

USACE - United States Army Corps of Engineers

USFS - US Forest Service

USFWS - United States Fish and Wildlife Service

USGS - United States Geological Survey

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1. Purpose of the Forest Management Plan

Nevada Irrigation District (NID) is taking a proactive approach to climate change, and seeks to improve natural processes that deliver ecosystem services in its supply watersheds. The Environmental Resources Program at NID is tasked with ensuring that the headwaters or origin of our water supply is managed for forest health and year-round flows. Forest management projects are the primary approach for protecting the watersheds we depend upon. Wildfire is a natural occurrence, however it is also the single largest threat to the forest condition and long-term capacity of the water supply and distribution system.

English Meadow is a 173 acre meadow in the headwaters of the Middle Yuba River, upstream of one of NID's largest water storage reservoirs, Jackson Meadows. Since 2016, and in partnership with the Sierra Nevada Conservancy, NID has engaged an interdisciplinary team in the fields of biology, botany, geology and geomorphology, including researchers from Sacramento State University, restoration experts and NID Staff. The team has been collecting data to assess current conditions in the meadow and surrounding forested watershed, and has concluded that forest health is in need of active management, and that hydrologic functionality is impaired and in a degrading trend that warrants intervention. Specifically, the goals of the Upper Yuba Headwaters-English Meadow Restoration Project are to undertake climate-smart restoration by: restoring channel/floodplain connectivity, improving forest health and wildfire resilience, improving and protecting montane meadow and aquatic habitats, and improving downstream water security and quality

English Meadow is located within the Upper Middle Yuba River headwaters, and is surrounded by notable landscape-scale restoration, research and conservation initiatives. This project is adjacent to Independence Lake and Sagehen Experimental Forest, the Truckee Donner Land Trust's activities at Perazzo Meadows and Webber Lake, and between the North Yuba Forest Partnership and Tahoe Central Sierra Initiatives. At a landscape scale, these projects will build resilience and provide critical refuge habitats, while enhancing and protecting rare headwaters communities. This mosaic of conservation efforts will be key as we adapt to climate change and invest in these invaluable and unique areas.

This management plan outlines the conditions and capability of English Meadow to provide ecosystem services, documents the landowner's objectives and decisions and identifies potential resource improvement projects. It is meant to be a flexible and educational document that considers a planning horizon of at least 10 years but may include objectives that require a much longer time period.

Land Owners Goals and Objectives

Ensuring the resiliency of Nevada, Place and Yuba County's many source watersheds is an important component of NID's larger effort to prepare for the effects of climate change, namely drought, flooding, and decreased annual snowpack, and to safeguard our water supply for the future.

Tasked with providing a sustainable supply of water for our growing communities, NID is always looking to the future to ensure that there will be water when we need it. With the changing climate causing less snowfall and more rainfall, it is more important than ever to be managing our watershed as the ultimate source of our water supply. Catastrophic wildfire risk has increased substantially in the last 10 years and is a primary objective of long-term resource management.

NID manages its lands and facilities to provide a dependable and quality water supply, continue to be good stewards of the watersheds, and conserve the available resources in its care. In order to accomplish this goal, NID must actively maintain reservoirs, water conveyance infrastructure, meadows, forested lands, and as much of the Bear and Yuba watersheds as possible to ensure regional ecological health, function, and resilience to disturbances like climate change and wildfire. Adapting to a changing climate and addressing present-day droughts have similar, if not the same, District goals:

- **Improve Operational Flexibility**
  - Increase upstream storage
  - Modified carryover storage targets and timing
  - Develop groundwater bank/expand conjunctive use
  - Implement forecast based on flood operations

- **Improve demand management**
  - Increase water use efficiency

- **Improve Resource Stewardship**
  - Improve Headwaters and Forest Health
  - Improve Riverine Ecosystems
  - Reduce likelihood and severity of wildfire, and restore resilient forest communities

- **Secure Institutional Agreements to Enable Flexibility**
  - Regional collaboration helps to achieve landscape level treatments that have regional watershed benefits

Specifically, the objectives of the English Meadow Floodplain Enhancement, Healthy Forest and Restoration Plan are as follows:

- Restore connectivity between the English Meadow floodplain and the channel of the Middle Yuba River.
- Reduce and manage the encroachment of lodgepole pine into the meadow to reduce the risk of wildfire ignition and reduce the severity of wildfire should it occur.
    - Allow for better success of riparian and wetland plant species.
- Reduce the density of conifers on the slopes of English Meadow to decrease wildfire severity, increase snowpack accumulation on north facing slopes, increase surface and sub-surface water availability, decrease competition for resources within the residual stand, and to increase carbon sequestration rates of remaining trees.
- Slow the velocity of the stream to reduce erosion and promote infiltration of water into the meadow aquifer.
- Reduce sediment delivery to Jackson Meadows Reservoir

The goal of this Forest Management Plan (FMP or Plan) is to identify best management practices that are ecologically sound, and result in functionality and overall health benefits for English Meadow. This Plan is provided as a guide to help accomplish the objectives and goals for the restoration of English Meadow and its surrounding watershed, which includes the headwaters to the Middle Yuba River. It will guide in achieving the benefits of managing the forest and forest related resources. This Forest Management Plan meets management plan requirements for grant agreements and other provisions available through participation in the Sierra Nevada Conservancy's (SNC) Watershed Improvement Program and other agency programs.

This FMP is a tool for and belongs to NID. It should be reviewed annually and updated as necessary.

2. Property Facts

Legal Description

Table 1: Parcel Location and Acreage

Section(s)	Township & Range MDB&M	Acreage	County	Assessor's Parcel Number	Coordinates
Portion of SE ¼ of SE ¼ of Sec 32	*T19N, R13E*	*78.53*	*Sierra*	*014-050-010*	*39°28'3"N, 120°31'56"W,*
Portion of S ½ of SE ¼ of Sec 32	*T19N, R13E*	*50.17*	*Nevada*	*015-210-010*	*39°27'50"N, 120°32'15"W*
Portion of N ½ of Sec 4	*T18N, R13E*	*225.07*	*Sierra*	*014-130-002*	*39°27'33"N, 120°31'3"W*
Portion of N ½ of Sec 4	*T18N, R13E*	*202.23*	*Nevada*	*015-030-005*	*39°27'18"N, 120°31'31"W*
	TOTAL ACRES	*556*			

Nearest City or Town: Truckee **Counties:** Nevada / Sierra

Description of the Property

The property is 556 acres in size. It is comprised of 4 parcels. The property is located in Nevada and Sierra Counties (55% within Sierra County and 45% within Nevada County). The Middle Fork of the Yuba River, Catfish Creek, and Secret Creek, are all Class I streams within the property. Approximately 35% of the area is on a northeast facing slope, 45% is on a southeast facing slope, and the remaining 20% is meadow area. Slopes range from 5% to 65% with the average slope within the operating area being 30%. The elevation ranges from about 6000' to 6400'.

English Meadow is approximately 35 miles northwest of Lake Tahoe and straddles the boundaries of Sierra and Nevada counties. The property consists of steep to moderately steep vegetated slopes on the north and south extents of the parcels with interspersed rock outcrops and numerous drainages and tributaries to the Middle Yuba River, which bisects the meadow located on the interior of the property and flows northeast into Jackson Meadows Reservoir. The northwest parcels of the property are vegetated, rocky and steep, with the Middle Yuba River growing narrower and faster moving in these reaches than in the upper reaches. The southwest parcels range from open grassland in the meadow floor with interspersed conifer and riparian tree species within the riparian corridor, to densely forested slopes of white and red fir, lodgepole pine, and Jeffery pine. The slopes of the meadow are densely overgrown and hold a significant amount of dead, dying, and downed woody material. The forest community on the slopes mainly consists of lodgepole pine, Jeffery pine, white and red fir, and white pine. These dense and dry forest conditions increase the risk of severe wildfire that may put the unique ecosystem of English Meadow at risk of disturbance. The north-facing slope of English Meadow is expansive with about 138 acres of dense alpine forest.

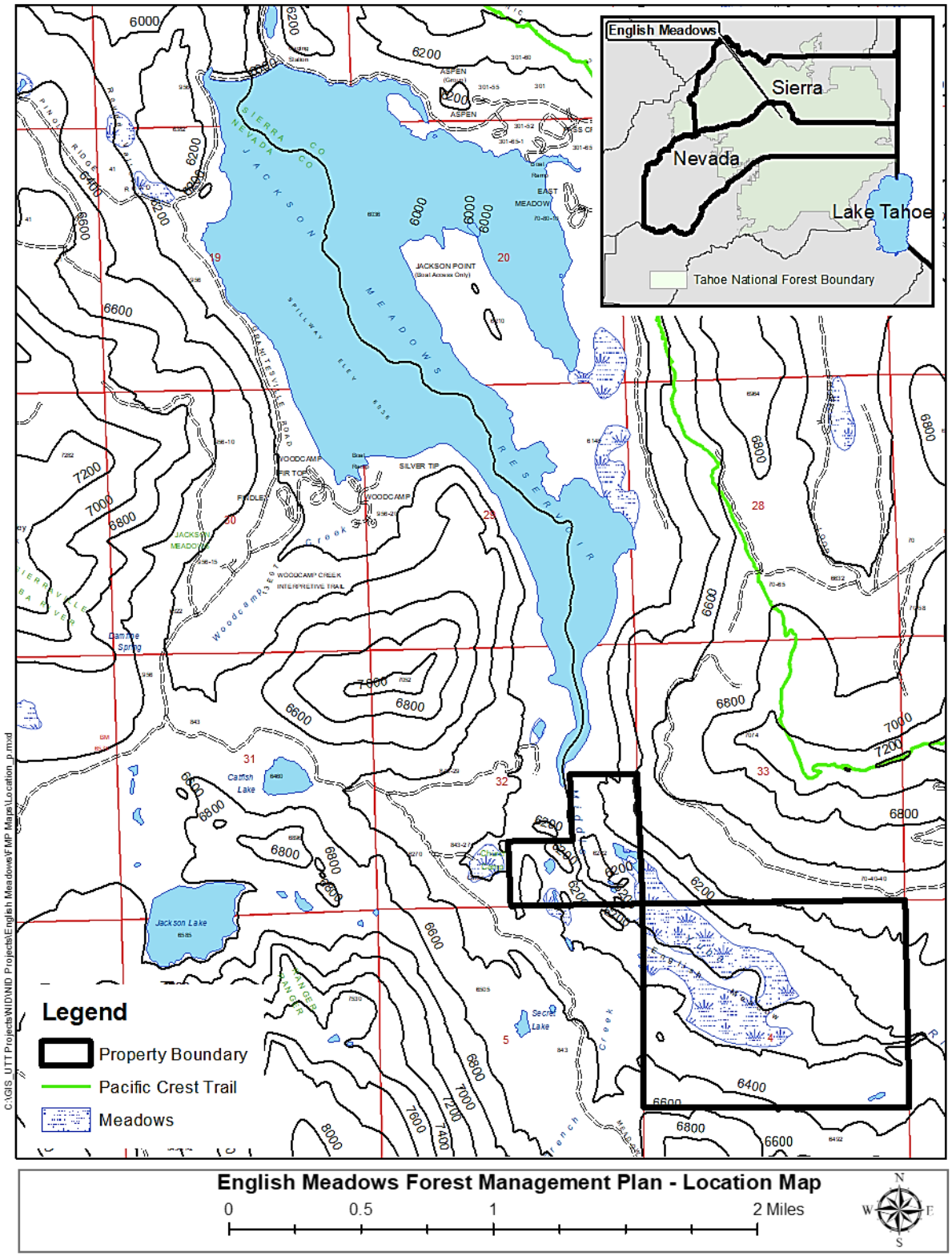
The meadow is located about 1.5 miles upstream of Jackson Meadows Reservoir and covers an approximate area of 173 acres; being 1.24 miles long and 0.23 miles wide. The Middle Yuba River, which bisects English Meadow, is one of the main tributaries flowing into Jackson Meadows Reservoir. This property holds the significance of being a rare montane meadow habitat as well as a hydrologically active, yet disturbed, water storage feature. English Meadow lies in the headwaters of the Middle Yuba River watershed, which is utilized by NID to collect and store water for its customers.

English Meadow appears to be in a xeric, or dry, trend due to the presence of drainage ditches installed to create grazing land for cattle, hydrologic disconnection of the floodplain and river channel, and headcutting in tributary creeks. The conversion of wet meadow soils to dry soils, among other factors, has allowed the encroachment of lodgepole pine into the meadow area. Lodgepole pine utilize much more water than small riparian plant species expected within meadows, and pose an increase in fire risk that would threaten the health and functionality of English Meadow.

Access

The Property is accessed via California State Highway 89, Jackson Meadows Road, Henness Pass Road, and Meadow Lake Road within the Tahoe National Forest.

Map 1: English Meadow Location Map



Watershed

NID owns approximately 11% of the watershed that flows into English Meadow. The remaining area is owned by the USFS (43%), Sierra Pacific Industries (34%), Land Trust (9%), and other small landowners (3%).

Calwater 2.2 Planning Watershed

Name & Number	**Watershed Acres**
English Meadows – 5517.430001	8,410
Jackson Meadows Reservoir – 5517.430002	4,144

Estimate percent of total acreage within the property that is:

Percent of Land Flat (<10% grade) 44% Gentle (< 20% grade) 32% Steep (> 35% grade) 24%

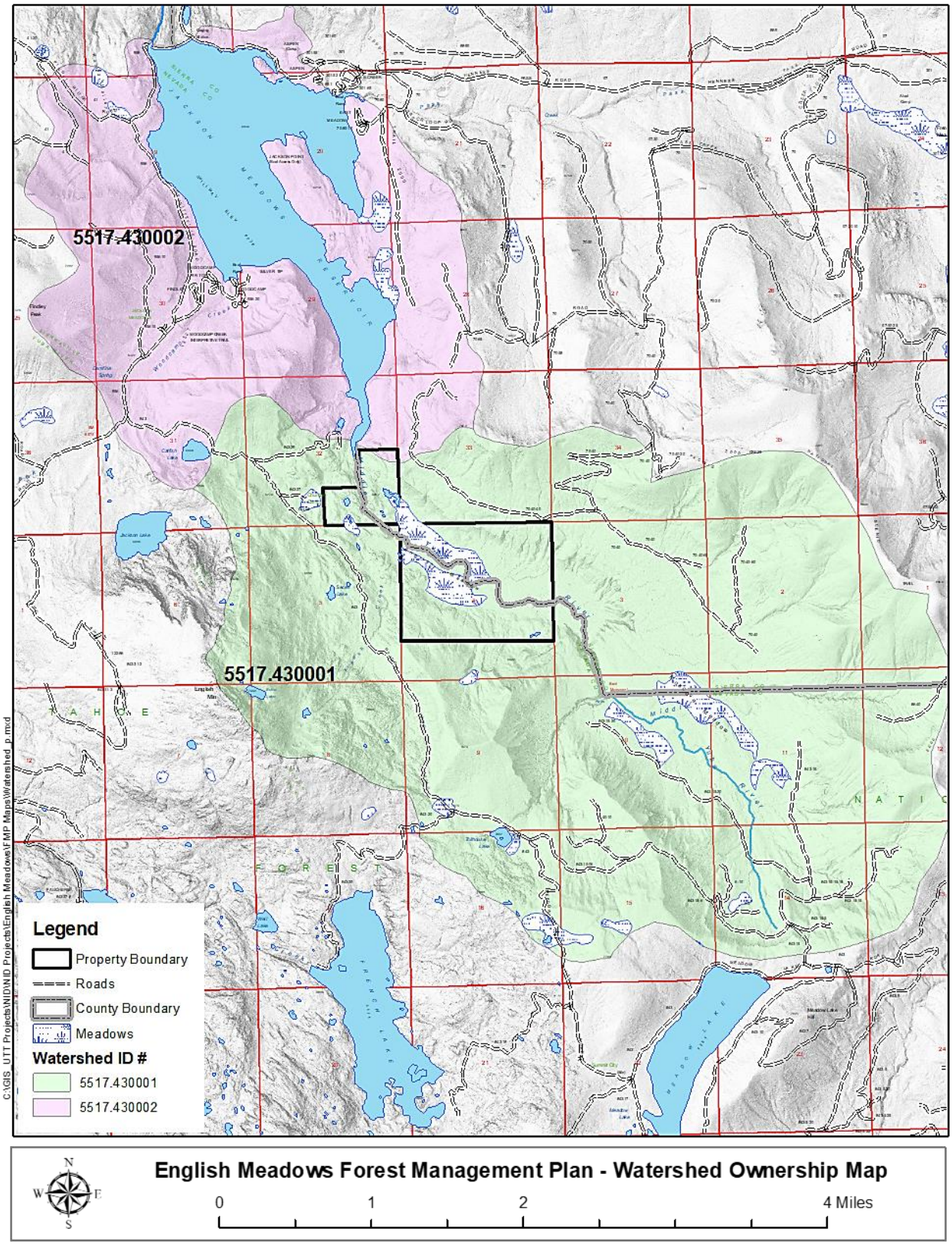
Transportation System Vehicle Access (check): _____ Excellent (80% accessible)

_____ Good (at least 50%) X Fair (at least 25%) _____ Poor (less than 10%)

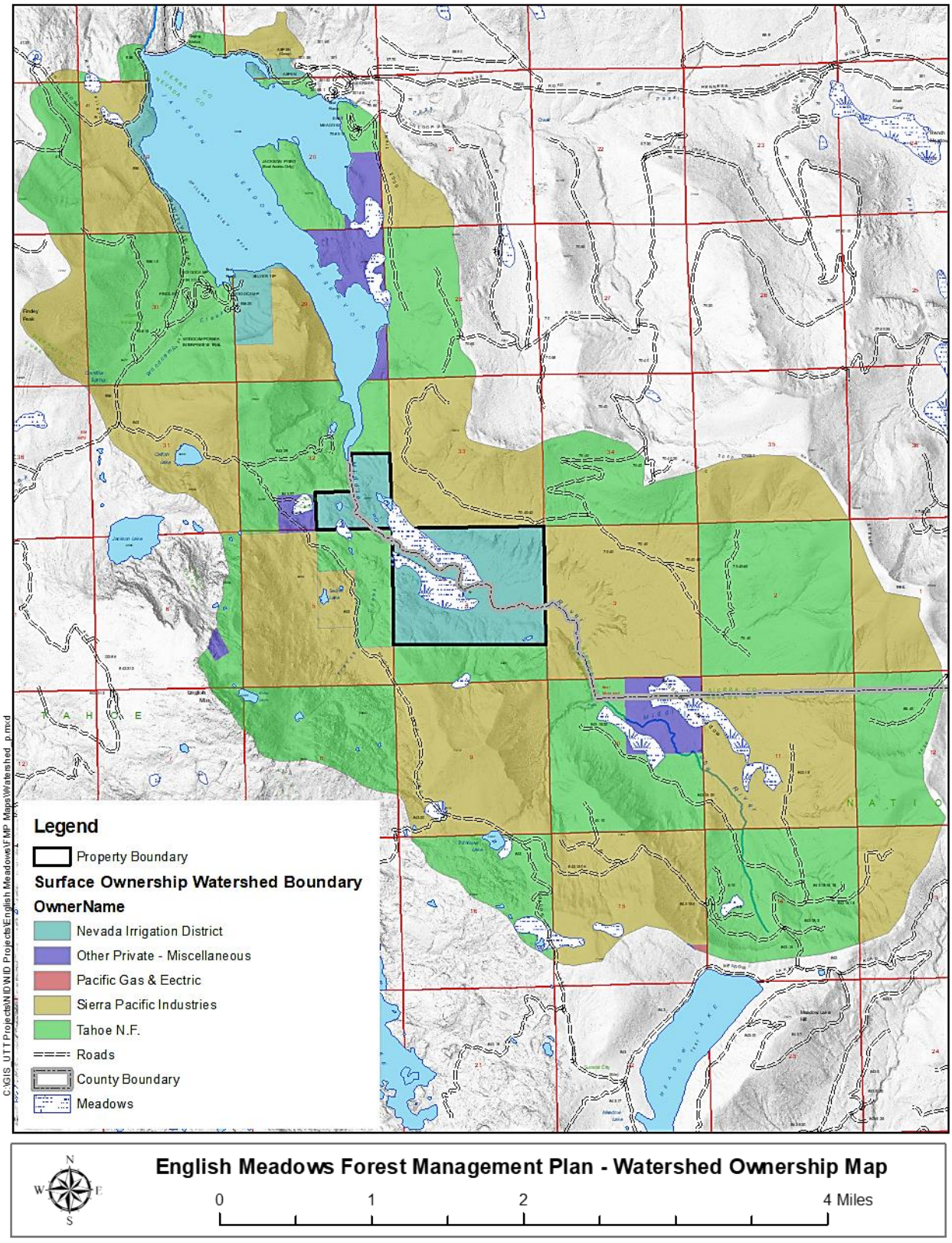
Estimated improved road length (surface): There are no improved roads within the project area.

Estimated unimproved road length: 1.5 miles

Map 2: Watershed Map



Map 3: Watershed Land Ownership Map



3. Property History

Historically, this land was tended through Traditional Resource Management and Traditional Ecological Knowledge[1] for at least 6,000 years by the Nisenan Native American Tribe, sometimes referred to as the Southern Maidu. Frequent controlled burns by this tribe, whose territory occurred in the drainages of the Yuba, Bear and American Rivers, controlled understory biofuels, supported culturally useful plant species, and limited conifer encroachment into open areas such as English Meadow (Anderson 2005).

In the early 1840's, Euro-American travelers began to frequently use the Truckee River Route to pass over the Sierra Nevada into California. While the Truckee River route was treacherous, the discovery of gold at Coloma in 1848 further increased traffic crossing the mountains in the region of English Meadow (Farquhar 1965). In order to bypass the Truckee River Route, and take a lower pass over the Sierra, Henness Pass Road was established on the ridge between the Middle and North Forks of the Yuba River.

Between 1848 and 1859; logging, milling, agriculture and transportation developments in the Sierra Region near English Meadow were in support of mining and mining towns. Methods of extraction of gold most often required plenty of water, which is why early mining settlements were focused on rivers. Current-day English Meadow lies in what was a productive, heavily populated mining area referred to as the "Northern Mines," whose high availability of water set it apart from similar mines in the southern Sierra Nevada (Giambastiani 2019).

In the mid 1850's water and mining companies began blocking streams to create reservoirs to supply the ever-expanding hydraulic mining operations throughout the Sierra. According to an article by Doris Foley from a publication called "One Hundred Years of Nevada County – 1851-1951", in 1858, a 125-foot tall wooden crib dam was constructed at the downstream end of English Meadow in order to inundate the meadow with water for use in hydraulic mining. In 1867 the North Bloomfield Gravel Mining Company purchased Rudyard (English) Reservoir, which was the largest reservoir in the state at the time, to supply water for their hydraulic mining operations (Malakoff Diggins State Historic Park 2017).

The site remained inundated for many years before the wooden dam ruptured, and rapidly drained the meadow. The dam was later rebuilt larger (131 ft) in stone in the same location, but again was destroyed in 1883 by a suspected intentional dynamite demolition by disgruntled downstream water users. Within one-and-a-half hours, the reservoir, which reportedly contained 535 million cubic feet (12,282 acre-feet) of water, was completely drained (Foley and Morley 1949).

These instances of rapid draining within English Meadow likely initiated the incision of the Middle Yuba River stream channel and its subsequent disconnect from the meadow floodplain (Mink 2016). The effects of the incision and disconnect are apparent in the heavy erosion and extreme high and

[1] Traditional Ecological Knowledge: Refers to the evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment. This knowledge is specific to a location and includes the relationships between plants, animals, natural phenomena, landscapes and timing of events that are used for lifeways, including but not limited to hunting, fishing, trapping, agriculture, and forestry. (U.S. Fish and Wildlife Service Website. https://www.fws.gov/nativeamerican/pdf/tek-fact-sheet.pdf)

low flows observed within the meadow as precipitation and snowmelt quickly flow through the meadow and into Jackson Meadows Reservoir without spilling out over the floodplain.

Since the last dam rupture in 1883, the English Meadow valley floor has been used to graze cattle. In a successful attempt to dry out the meadow soils to allow for better grazing, drainage cuts were dug on the north and south slopes. These drainage cuts led to the dieback of riparian plant species in that area and contributed to the encroachment of lodgepole pine into English Meadow. Today the meadow lies within the English Grazing Allotment, administered by the US Forest Service. There is some evidence that grazing is presently occurring within the site although it has not been officially allowed, and the evidence is not extensive. Too much grazing pressure has the potential to disturb to soils, vegetation, and some of the fen (bog/wetland) habitats located within English Meadow. The drainage cuts and low-to-moderate grazing pressure have contributed to the presence of invasive plant species, reduced species diversity, and complete habitat conversion of English Meadow from a periodically inundated wetland meadow to a dry, degraded and eroding grassland.

The southern slope of English Meadow was harvested in the late 90's which is indicated by the uniform age and species structure of the undergrowth and the presence of old skid trails. In addition, multiple timber harvests have occurred in the immediate vicinity around the English Meadow Property, and a 1978 archaeological survey preceded the construction of the Pacific Crest Trail through the Tahoe National Forest; a 2.5 mile section of which crosses the property line on the north slope (Giambastiani 2019).

A confidential archaeological records search was conducted for the entire property. Archaeology is confidential, and this report is on file with NID.

In August 2018, G2 Archaeology conducted a cultural resources inventory of a 560-acre parcel at English Meadow, Nevada and Sierra counties, California, for the Nevada Irrigation District Yuba Headwaters Healthy Forest Project. The surveyed area comprised two blocks, the first covering the meadow proper, as well as adjacent hillslopes to the northeast and southwest, and the second, an L-shaped block near the location of the historic nineteenth century English Dams.

View of the historical rock dam that blocked the Middle Yuba River to create a reservoir at English Meadows during the Gold Mining Era. ***(Beedy, E.C. 2018. Animal Resource Evaluation)***

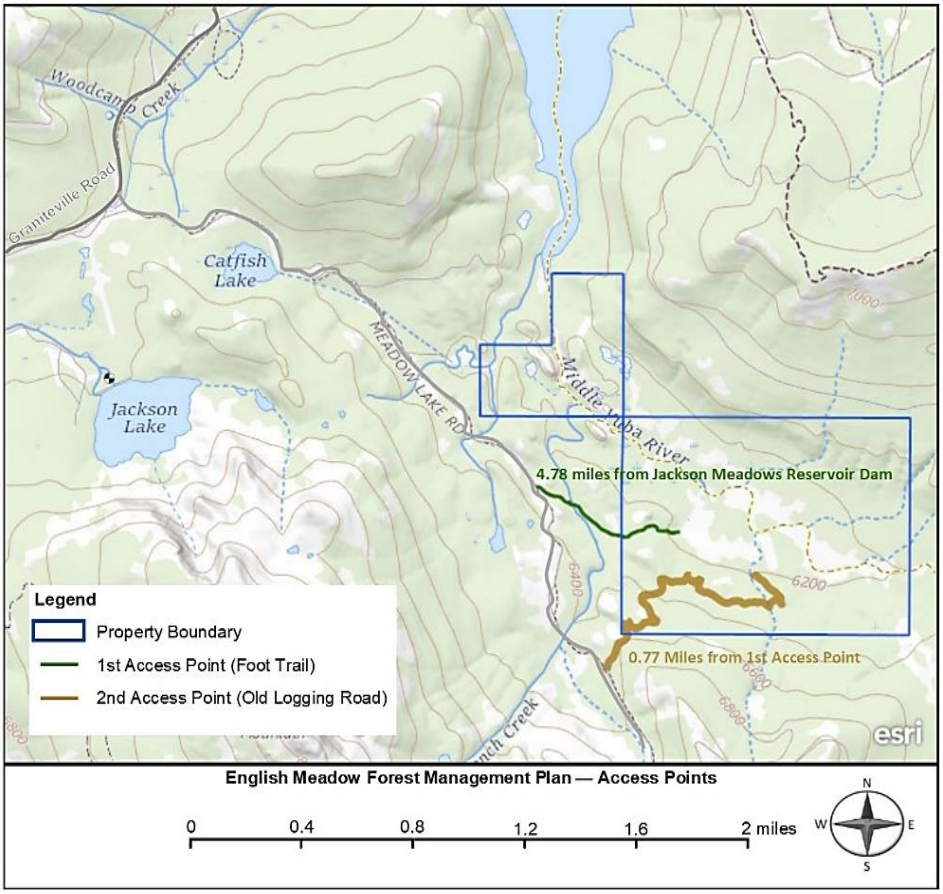
English Reservoir, distant (Carleton Watkins, 1871, 1071-502) ***(G2 Archaeology. 2019. A cultural Resources Inventory of 560 Acres at English Meadow, Nevada and Sierra Counties, California)***

4. Current Conditions

Roads

Access Roads to the property are paved until Graniteville Road on the west side of the Jackson Meadows Reservoir Dam. There is about 4.78 miles of graveled, recently graded, roads that lead up to the first access point and staging area where the meadow is accessible on foot. From that point there is about 0.77 miles of ungraded rocky roadway and small creek crossings that lead to the second access point which is an old logging road that leads into NID property and is currently passable on-foot only. If re-opened, this logging road may serve as additional access to the southern slope of the meadow where proposed treatments would occur. Increasing the accessibility of this road would require widening the road, installing temporary waterway crossings, and trimming brush and downed logs from the centerline and sides of the road.

Map 4: Access Point Location Map



Forest Structure

Forest types and their productivity are generated by variation in topographic position and substrate, soil water and nutrient availability, and stand age, management regime and land-use history. Understanding the land-use history of your property is an important step towards understanding how to manage your forest in the future.

The California Wildlife Habitat Relationships (CWHR) is a state-of-the-art information system for California's wildlife.[2] The CWHR classifies existing vegetation types important to wildlife. This system was developed to recognize and logically categorize major vegetative complexes at a scale sufficient to predict wildlife-habitat relationships.

The California Wildlife Habitat Relationships system identifies 7 vegetation types, water, river, and barren land.

The property was stratified by the CWHR vegetation habitat types. An inventory was conducted to verify or "ground truth" the vegetation types. The types as summarized in **Table 2,** are a complex mosaic of species mixes, and productivity classes, grouped by a set of "membership rules".

[2] California Wildlife Habitat Relationships (CWHR) is a state-of-the-art information system for California's wildlife. CWHR contains life history, geographic range, habitat relationships, and management information on 712 species of amphibians, reptiles, birds, and mammals known to occur in the state. The DFG's California Wildlife Habitat Relationships System (WHR) was created as a tool for wildlife biologists and natural resource managers to model the effects of habitat change on wildlife species.

Relatively uniform vegetation types may contain habitat patches within them that are highly unique in terms of life form (e.g. a small wet meadow within a conifer stand) or structure (e.g. large trees with uneven structure and downed woody debris within a stand of otherwise small trees and even structure).

Site potential can be classified either qualitatively, by their climate, soil, and vegetation into different site types or quantitatively, by their potential wood production. Site Productivity Class is best described as a species-specific classification of forest land in terms of inherent capacity to grow crops of trees and is usually derived from site index.

Site index is based on measuring the height and deriving the age of dominant and co-dominant trees in the forest stand, and relating this to a standard base age, for example fifty (50) years. Site class, usually numbered in Roman numerals from I (best) to V (worst) is a grouping of site indexes used when the California Forest Practice Rules apply to commercial timber-harvesting operations.

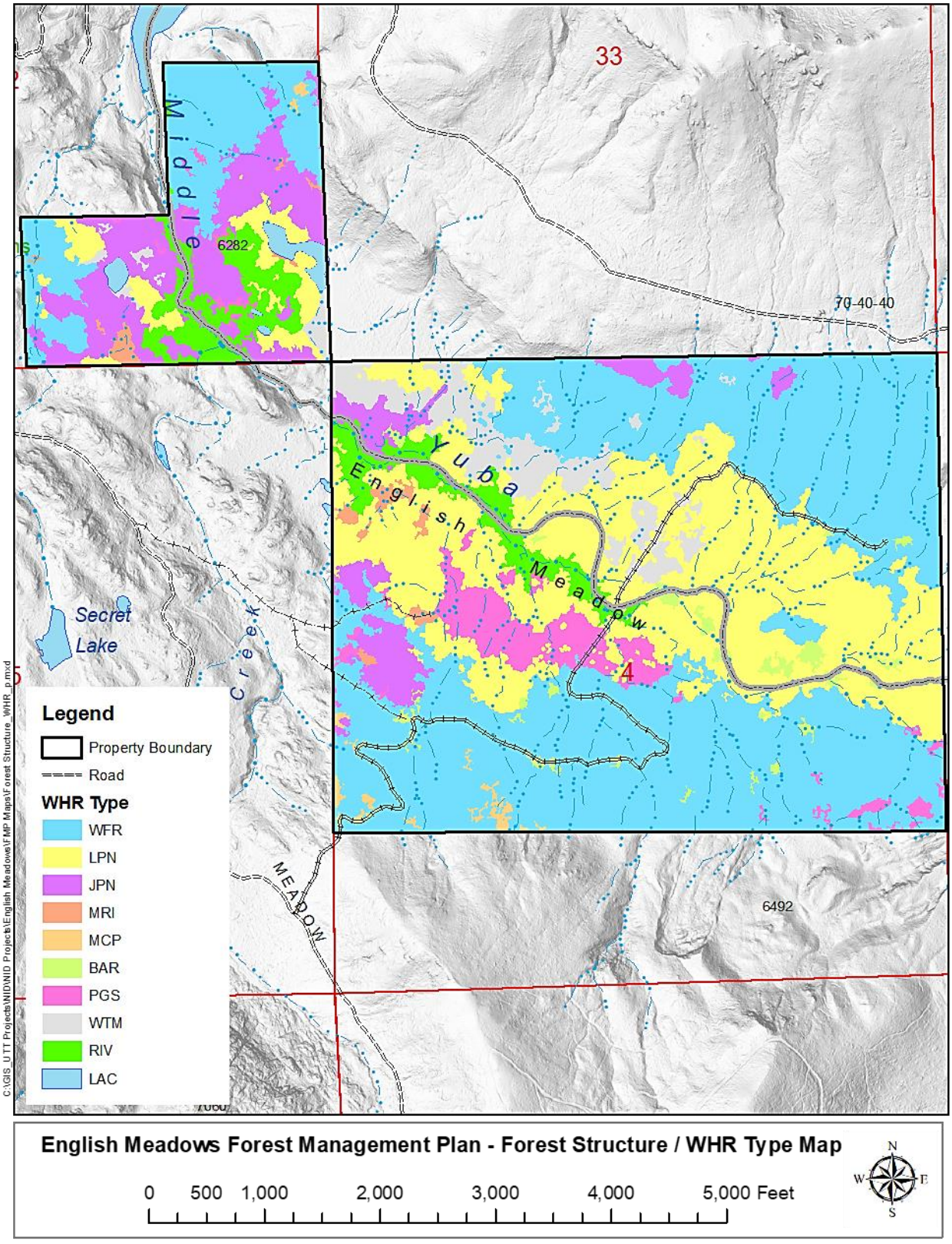
Site Index is determined by measuring tree heights and using increment borings of dominant trees to determine tree age, and the use of *Research Note No. 28, A Site Classification* for *Mixed Conifer Selection Forests* of *the Sierra Nevada 1942,* Duncan Dunning.

Per Title 14 California Code of Regulations, 1060 - Site Classification, site information suggests that the project areas conifer habitat types; Forest (WFR, LPN and JPN), consist of Site Index II/III/IV timberland with growth ranging from 255 to 480 bd. ft. per acre per year.

Table 2: Wildlife Habitat Relationships System Habitat Types and Acreage

Vegetation Type	Acreage
White Fir (WFR)	**302.04**
Lodgepole pine (LPN)	**129.6**
Jeffery pine (JPN)	**46.46**
Montane Riparian (MRI)	**3.3**
Montane Chaparral (MCP)	**2.2**
Barren (BAR)	**4.0**
Perennial Grassland (PGS)	**16.7**
Wet Meadow (WTM)	**21.7**
River (RIV)	**27.3**
Lacustrine (LAC)	**2.7**
Total	**556 Ac**

Map 5: Wildlife Habitat Relationships Map



White Fir (WFR) 302.04 Ac

The White fir **(WFR)** habitat types are approximately three-hundred and two (302.04) acres. The species composition is primarily made up of White fir with equal amounts of Jeffrey pine, and Western White pine. Jeffrey pine commonly replaces ponderosa pine at these elevations.

In general, the timber types associated with the WFR habitat types are approximately 120+ years-old, with pockets of dense, white fir in the understory. Overstocking of the understory will stress the stand and can predispose it to bark beetle attack. Reduction of stocking in the understory would improve the overall health and reduce the possibility of a crown fire, as interlaced crowns provide a continuous elevated fuel bed through which a fire could spread.

Forest on south slope of English Meadow

Lodgepole pine (LPN) 129.6 Ac

The Lodgepole pine **(LPN)** habitat types are approximately 130 acres adjacent to, and invading the meadow. Lodgepole pine is found in open stands of similarly sized specimens in association with few other species. The meadow understory is virtually absent, consisting of scattered shrubs and herbs, or a rich herbaceous layer at meadow margins. On the slopes, continued recruitment produces overstocking, slow growth of the overcrowded trees and mortality due to competition. The overcrowding also makes these stands susceptible to insects. Beetle infestation creates large quantities of fuel that increase the probability of wildfire.

Three major disturbances affect lodgepole pine in California: fire, insects, and logging. These disturbances create openings of various sizes that lodgepole pines rapidly recolonize.

The boundaries between lodgepole pine and meadow are dynamic, they are easily differentiated in classification of the existing landscape. Lodgepole pine is most closely associates with the True fir habitat of mid-elevations. Although lodgepole pine is widespread, it is generally a minor forest element in other habitats.

Jeffery pine (JPN) 46.46 Ac

The Jeffery pine **(JPN)** habitat type is approximately 46.46 acres. Jeffrey pine is the dominant tree with less representation by white fir, and western white pine. Open tree stands generally support more vigorous brush which prevents additional tree regeneration. In general, the habitat types associated with the JPN include Eastside Pine (EPN) and Montane Chaparral (MCP). Most of these stands were heavily logged during the 1800's to support dam construction. Small residual stands exist on the steep facing south slope with isolated individual trees on the north slope.

The understory includes western juniper, manzanita, several species of ceanothus, big sagebrush, antelope bitterbrush, grass dominance and forb dominance depending on aspect and soil types.

Jeffery and Eastside pine communities are often bounded at the lower elevations by sagebrush, bitterbrush, and annual grassland. These stands often form important migratory and winter range for deer. Higher elevation stands with grassy understories near water may be extremely important deer fawning areas and migratory holding areas.

Montane Riparian (MRI) 3.3 Ac

The Montane Riparian **(MRI)** habitat type includes several small areas totaling approximately 3 acres. The Montane riparian zone occurs as a narrow, dense groves of thinleaf alder, and white alder in the understory with an overstory of aspen or cottonwood (black or Fremont), up to 15 m (49 ft) high. On the higher, south facing slopes MRI is not well developed and occurs mainly in the shrub stage.

The transition between MRI and adjacent non-riparian vegetation is abrupt, due to topography and a change in soil type. This habitat type intergrades with montane chaparral, montane hardwood, montane hardwood/conifer, lodgepole pine, white fir and wet meadow habitats.

Montane Chaparral (MCP) 2.2 Ac

The Montane Chaparral **(MCP)** species composition changes with elevation and geographical range, soil type and aspect. This habitat type makes up about 2 acres. This type includes whitethorn ceanothus, snowbrush ceanothus, greenleaf manzanita, pinemat manzanita, and sierra chinquapin.

Montane chaparral occurs in gradations between two characteristic successional sequences: the first sequence is associated with poor, shallow soils overlying fractured bedrock.

In the second sequence, chaparral is found on deeper forest soils following a disturbance. After disturbance (logging, fire, erosion) chaparral can facilitate the germination of shade tolerant conifers by providing a protective cover, moderating microclimate, and improving soil conditions.

Montane chaparral adjoins a variety of other wildlife habitats, including montane riparian (MRI), and perennial grassland (PGS). It has become established in the disturbed coniferous habits of Jeffrey pine (JPN), and lodgepole pine (LPN).

Barren (BAR) 4.0 Ac

Barren **(BAR)** habitat is defined by the absence of vegetation. Any habitat with <2% total vegetation cover by herbaceous, desert, or non-wildland species and <10% cover by tree or shrub species is defined this way. This category includes mappable landscape units in which the surface lithology consists of exposed bedrock and cliffs.

Perennial Grassland (PGS) 16.7 Ac

The Perennial Grassland **(PGS)** habitat type is approximately 17 acres. These areas are located within, and adjacent to, the meadow. The species composition of the perennial grassland habitat is common with Wet Meadow (WTM) habitats. Structure in Perennial Grassland habitat is dependent upon the mix of plant species at any particular site. Surveys for rare and special-status plants and suitable habitats were conducted in 2018 and during the flowering period in June 2019 by qualified botanists: Dr. Michelle Stevens, Michael Dolan and Milo Kovet. Their findings and recommendations for mitigation strategies are shared in a series of two reports (Stevens 2018, 2019).

Perennial grass in this region is more associated with the Wet Meadow (WTM) habitat found along with Lodgepole Pine (LPN), and Jeffrey Pine (JPN).

View of the dry meadow with scattered patches of willows and lodgepole pines on the Nevada County side of the Middle Yuba River. *(Beedy 2018)*

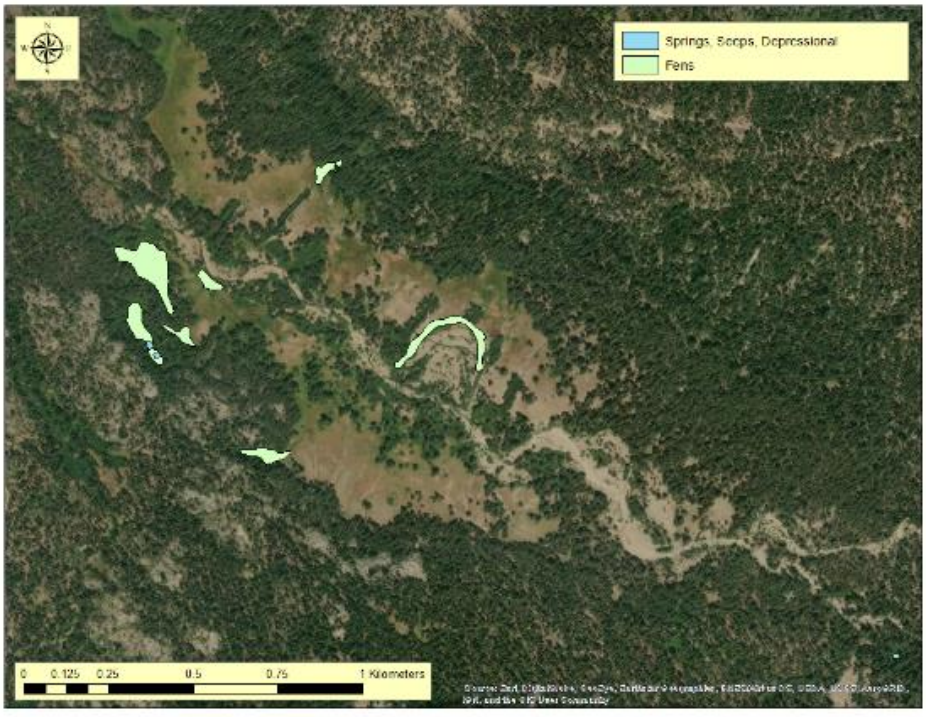
Wet Meadow (WTM) 21.7 Ac

Wet Meadows at all elevations generally have a simple structure consisting of a layer of herbaceous plants. Shrub or tree layers are usually absent or very sparse; they may, however, be an important feature of the meadow edge.

View of the wet meadow on the Sierra County side of the Middle Yuba River. ***(Beedy 2018)***

Generally, Wet Meadow communities succeed bog or fen communities; which can still be found throughout the meadow. In turn, Wet Meadows are succeeded by mesic meadows and by dry meadows or forest. Mesic and dry meadows may have a sparse cover of shrubs. Succession to coniferous forest is frequent at montane and subalpine elevations.

Map 6: Fens, Springs and Seep Locations at English Meadow. ***(Stevens 2018)***



English Meadow is bisected by the Middle Yuba River and is surrounded by dense patches of willows (*Salix* spp.) and alders (*Alnus* spp.). Lodgepole pines (*Pinus contorta* ssp. *murrayana*) occur on the meadow margin. It is evident that the Middle Yuba River frequently overflows its banks due to steep cut banks and the scouring and lack of soils in many areas, especially on the Sierra County side of the river (Stevens 2018).

River (RIV) 27.3 Ac

Intermittent or continually running water distinguishes rivers and streams. A stream originates at some elevated source, such as a spring or lake, and flows downward at a rate relative to slope or gradient and the volume of surface runoff or discharge.

Riverine habitats can occur in association with many terrestrial habitats. Riparian habitats are found adjacent to many rivers and streams. Riverine habitats are also found contiguous to lacustrine and fresh emergent wetland habitats.

View of the Middle Yuba River showing willows and other riparian vegetation growing intermittently along the river channel. ***(Beedy 2018)***

Currently, the Middle Yuba River channel is disconnected from the English Meadow floodplain due to an incised river channel. Flooding and precipitation events since the exposition of the meadow soils following the draining of English Reservoirs have resulted in severe scouring, channel degradation and bank erosion.

Middle Yuba River showing bank erosion and subsequent debris. ***(Neysa King, NID)***

Lacustrine (LAC) 2.7 Ac

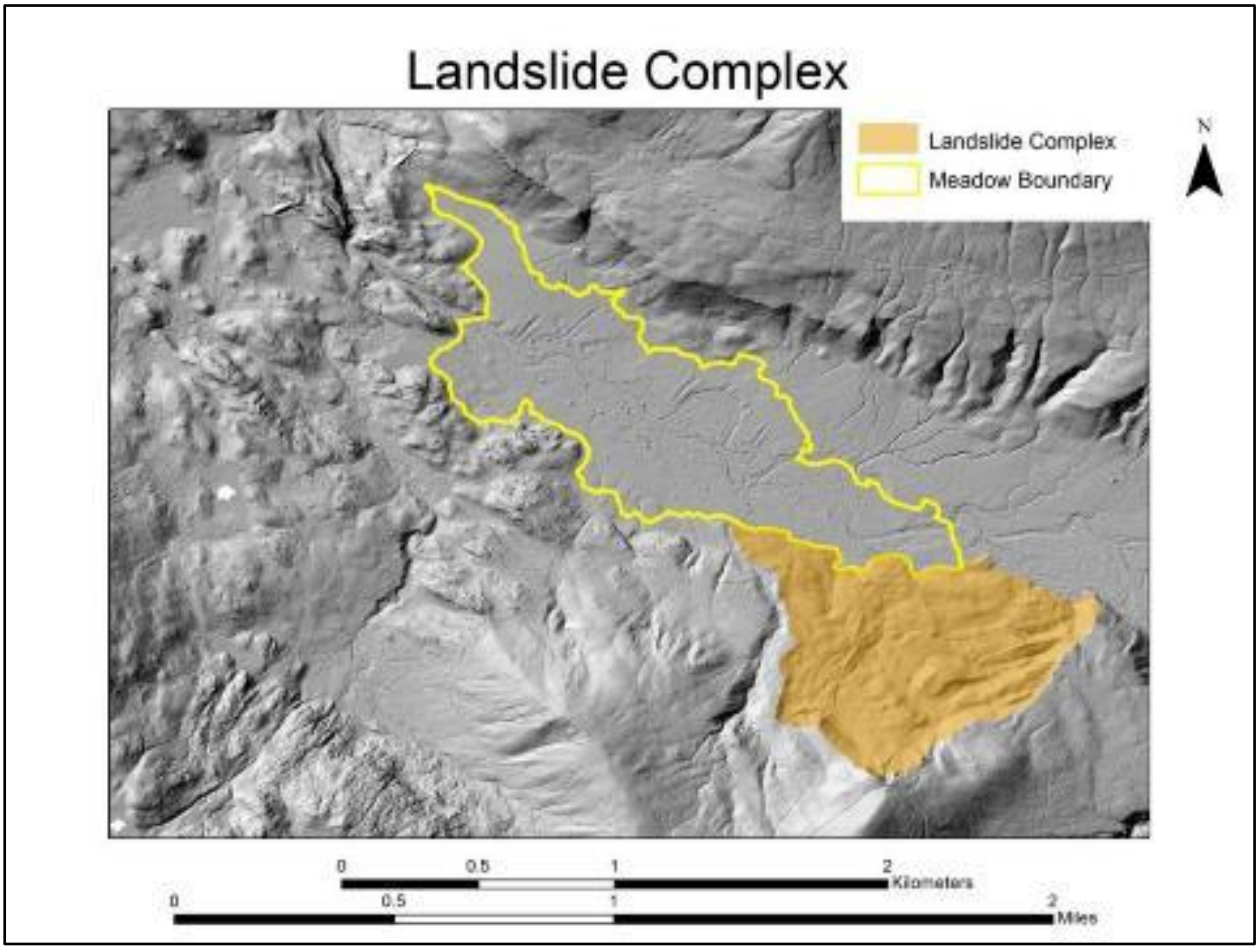
Lacustrine habitats are inland depressions or dammed riverine channels containing standing water. Most permanent lacustrine systems support fish life; intermittent types usually do not.

Lacustrine habitats may occur in association with any terrestrial habitats, Riverine (RIV) and Fresh Emergent Wetlands (FEW).

Geology

Geology was assessed and reported by Kevin Cornwell and Ben Middendorf of the Geology Department at Sacramento State University. At the landscape scale there is a large landslide complex that occurs on the southeast slope of the meadow.

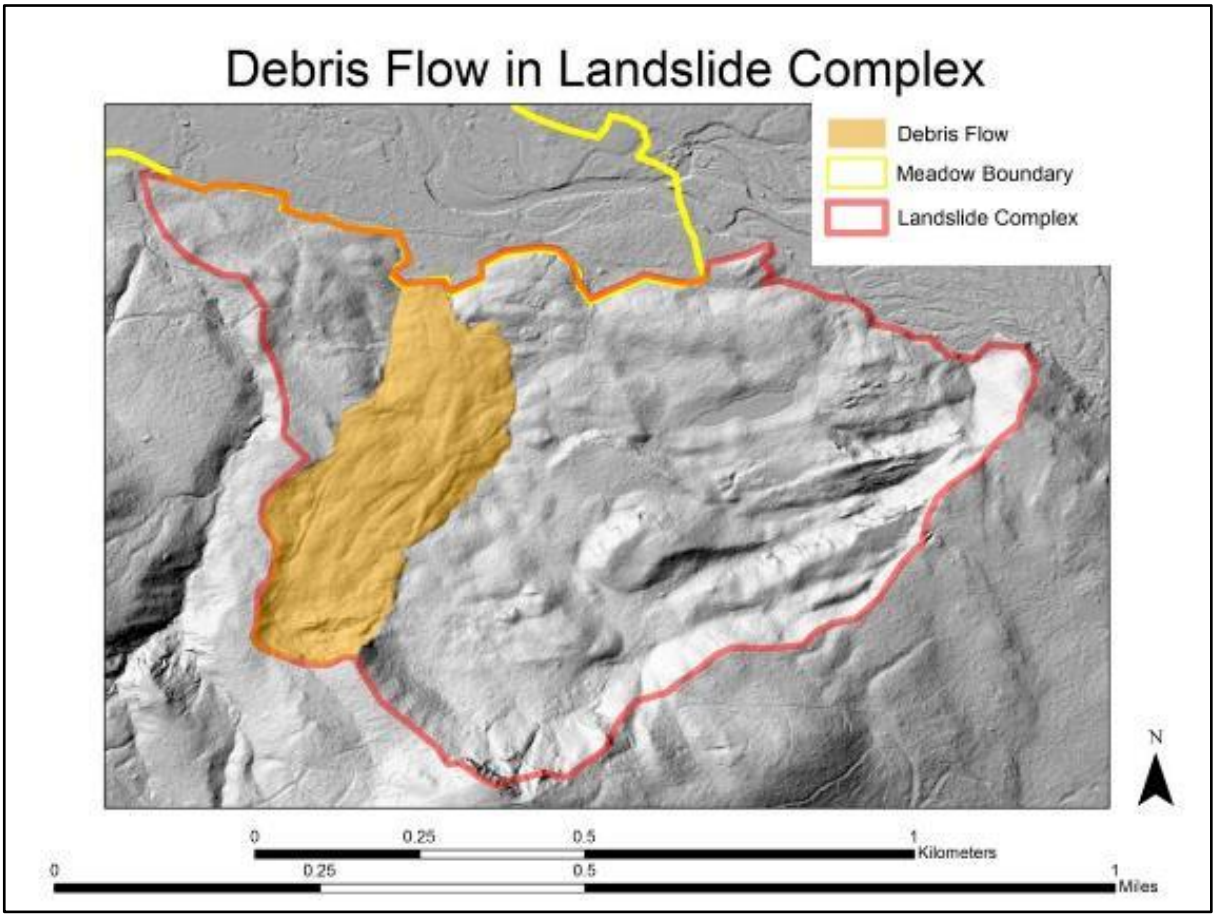
Map 7: Landslide Complex on Southeast Margin of English Meadow



While the age of this complex is unknown, there is evidence of at least two episodes of movement. The first seems to have been a substantial rotational landslide that covers a surface area of 0.19 miles^2 (0.50 km^2). The second episode of movement appears to be a smaller debris flow (surface area of about 0.03 miles^2 (0.09 km^2) that originated in the failed mass from the previous episode of movement. Clear patterns of more fluid sediment movement are visible on high-resolution digital elevation model data.

The river channel throughout most of the meadow is about 100 feet wide. However, in the area near the landslide complex, the channel widens significantly to over 300 feet, suggesting that the landslide may have played a role in the destabilization of the river channel in this area of the meadow. While the cause of the landslide is unknown, and it is unclear if conditions in this area are prone to additional slope failures, any future landslide activity could change the channel conditions and destabilize restoration efforts taken within English Meadow.

Map 8: Debris Flow on the Southeast Slope above English Meadow.



The meadow surface area is about 740,142 m^2 (0.7 km^2). Meadow volume is approximately 1,684,630 m^3 and is comprised of the various sediments that make up the meadow. All groundwater stored within the meadow volume must be stored within the void space (measured as porosity) that exists in the sediment.

According to coring samples taken at English Meadow during the establishment of a hydrological monitoring network by Dr. Kevin Cornwell and the Department of Geology at Sacramento State University, the predominant sediments throughout the meadow base are fine-grained silty clays, silty clays with sand and gravel, poorly graded sands, and poorly graded sands with some gravel.

Considering the geographic location of the Meadow surface relative to the modern-day stream channel and the historic man-made lake that was in place in the latter 1800's, the fine to coarse assemblage of sediment makes sense. Frequent overbank flooding of the stream channel during high snow melt – runoff conditions would have carried and deposited both fine and coarse grained sediment across the inundated meadow surface while ponding from the short-term damming of the Middle Yuba River by early settlers and miners would have produced fine grain sedimentation across the entire flooded meadow surface.

Generally, fine-grained silty clays make up the upper three to seven feet of the meadow. Occasionally these silty clays contain sands and gravel seams, which is consistent with frequent

overbank flooding and reservoir ponding on the meadow surface. Sand and gravel materials were commonly encountered below the silty clay sediment. These sediments were generally where groundwater was encountered. The sand and gravel seems to be fairly continuous throughout the meadow subsurface.

Soils

Soil is the basic resource of the forest and is key to the productivity of an area. A major goal for soil resource management is long-term maintenance of soil productivity and watershed protection.

Forest landowners who wish to practice good stewardship on their lands need to assess the potential negative impact of their management activities on soil and water resources both on and off their property. Soil and water conservation is focused on the prevention of erosion and off-site movement of sediments, nutrients, and pesticides, the maintenance of normal water levels in wetlands, and the reduction of flood flows into estuaries.

Controlling soil erosion, compaction, and maintaining the nutrient balance during timber harvest, reforestation, and vegetative manipulation is vital to long-term soil productivity and protection of down-stream water quality. Practices include maintaining ground cover to reduce soil loss and limiting heavy equipment use on soils during wet weather.

If practices are not performed properly, they have the potential for significant topsoil and nutrient loss. This often results in reduced productivity and increased off-site water pollution. Additionally, the cumulative effects of drainage projects in a region often result in reduced water storage capacity and increased downstream flooding, as well as reduced fish/wildlife habitat and species diversity.

Soils are an important environmental variable in that they reflect many of processes that shape the natural landscape. They are good indicators of the parent geologic formations beneath them and thus can aid in defining geologic strata. Soils are also the products of topography, hydrology, climate, and flora, which allow them to be used as general environmental indicators.

According the current USDA Web Soil Survey, there are fourteen (14) soil series and several rock-out crops, barren and riverwash areas throughout the property.

Map 9: Soil Types and Location

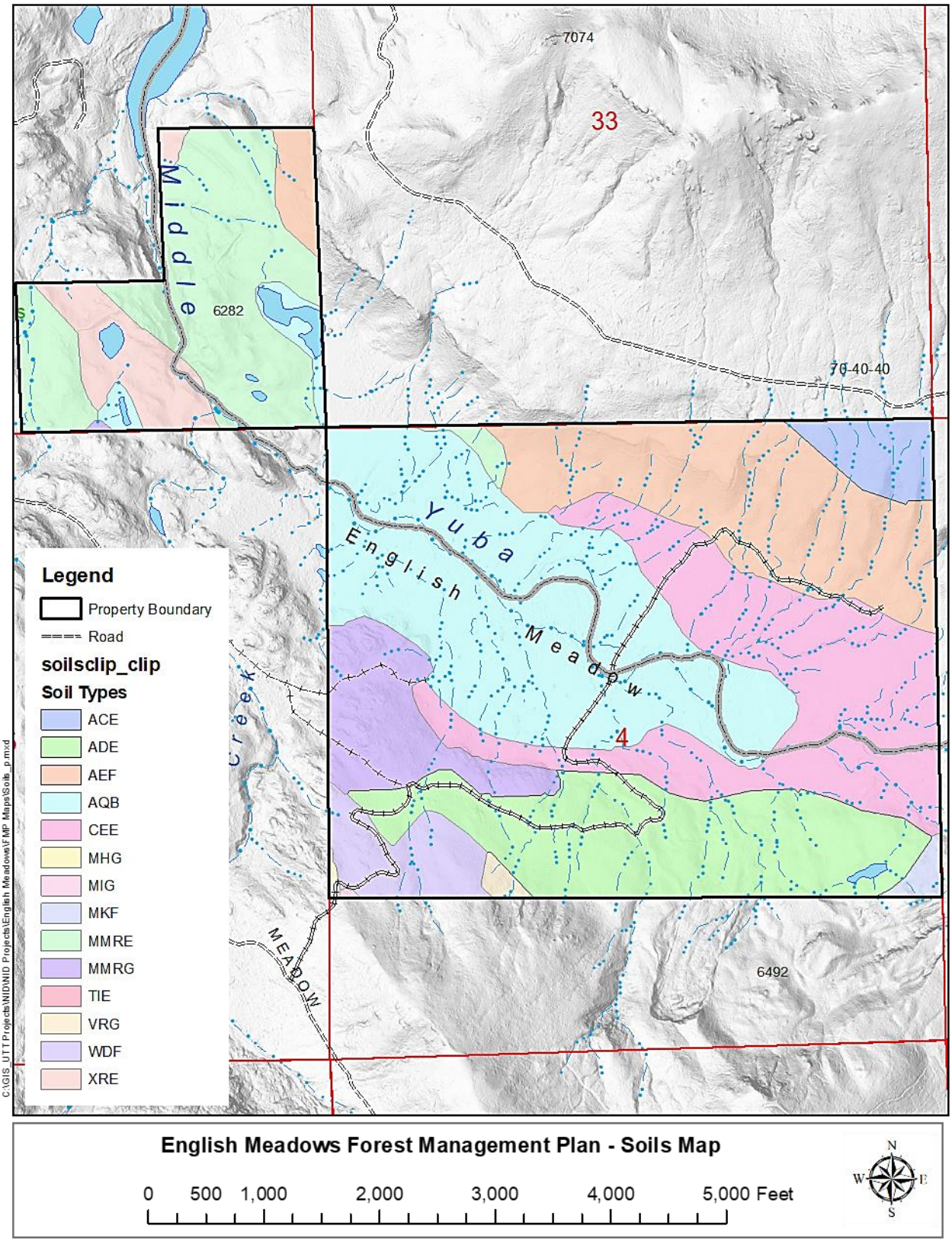


Table 3: Soil Types, Acreage, and Percent of Property

Soil Type	Acres	% of Property
ACE, Ahart-Waca	13.2	2%
ADE, Ahart-Waca	74.1	13%
AEF, Ahart-Rock outcrop	80.9	15%
AQB, Aguolls and Borolls	143.25	26%
CEE, Celio-Gefo Aguolls	93.0	17%
MHG, Meiss - Gullied land - Rock outcrop	0.7	0.13%
MIG, Meiss-Rock outcrop	0.3	0.05%
MKF, Meiss-Waca complex	3.3	1%
MMRE, Rock outcrop	71.2	13%
MMRG, Rock outcrop	32.6	6%
TIE, Tinker-Rock outcrop	0.05	0.01%
VRG, Rock outcrop, volcanic	2.1	0.38%
WDF, Waca-Meiss complex	20.0	4%
XRE, Tinker-Rock outcrop	21.3	4%
Total	***556***	***100%***

[See Appendix 1, Soil Type Descriptions] for more details.

Timber Inventory

UTT conducted a study of the property and compiled into a Geographic Information System (GIS) all available base maps and aerial imagery to construct a comprehensive geographic database of the property. Using the database, UTT analysed the land cover of the property, and used the CWHR system to stratify the property into vegetation types.

UTT sampled the conifer habitat types using a stratified, variable plot cruising method. Plots were measured using GPS and compass for locations, spinning a 20 BAF prism and measuring trees to two-inch size class using a steel tape. Tree position, heights and form factor were measured using a Spiegel Relaskop.

The property has three timber production areas with variable soil conditions: the predominant vegetation type is White Fir (WFR) with smaller areas of Lodgepole pine (LPN), and Jeffery pine (JPN).

The stand information was entered into the Forest Vegetation Simulator (FVS). FVS is a model used for predicting forest stand dynamics that is used extensively in the United States. Forest managers have used FVS extensively to summarize current stand conditions, predict future stand conditions under various management alternatives, and update inventory statistics. Output from the model is used as input to forest planning models and many other analysis tools. In addition, FVS has been linked to other Forest Service corporate software such as databases and geographic information systems.

Uses of FVS are not restricted to timber management applications. Other uses of FVS include considering

how management practices affect stand structure and composition, determining suitability of stands for wildlife habitat, estimating hazard ratings for insect outbreaks or wildfires, and predicting losses from fire and insect outbreaks.

FVS was used to compare the volume, growth, and regeneration projections of conifers with known yield tables (Technical Bulletin 354, USDA (Dunning & Reineke 1933)), and the sampled site tree growth calculations based on the past five and ten-year growth periods. All inventory information and calculations are on file with the RPF.

Species composition: The present species composition is True Fir 86%, Jeffrey Pine 3%, White Pine 7%, and Lodgepole Pine 4%.

Present stocking level: On the upper elevations of the north and south facing slopes, the stands are two and/or three tiered, predominantly White Fir (WFR) type. On the north facing slopes stands are comprised of large scattered overstory, 150+ years old, 30"+ DBH, Red and White fir, (1-2 per acre) in the upper tier, which are declining in vigor and/or have considerable defect. On the south facing slope the majority of the dominant trees are Jeffrey Pine and White Fir. Some of the Jeffrey Pine are infested with mistletoe, which is infecting the lower two tiers. The upper tier ranges from 10 to 40 square feet per acre.

The middle tier is comprised of co-dominants, saplings, and suppressed trees which range in age from 15 to 145 years of age. The basal area of this tier is from 40 to 80 square feet and needs to be thinned in some areas. The trees in this tier are generally healthy with some infestations of dwarf mistletoe. Both the upper and middle tiers have trees with considerable mechanical damage from the previous harvests. The bottom tier is comprised of seedlings (mostly white fir with minor amounts of white pine) ranging in height from 1 to 8 feet.

These WFR stands vary in basal area per acre of 50 to 180 square feet in the merchantable 12" to 50" diameter range with an average 148 sq. feet per acre. The QMD is 7” with approximately 630 trees per acres representing approximately 14 Mbf per acre. The sub-merchantable 2" to 10" conifers average 10 square feet per acre with an average 335 trees per acre.

On the mid-elevations of the north and south facing slopes, there are small stands of Jeffery pine (JPN) type. These stands are comprised of large scattered overstory, 150+ years old, 30"+ DBH, Jeffery pine, (1 per acre) in the upper tier. The upper tier ranges from 5 to 10 square feet per acre.

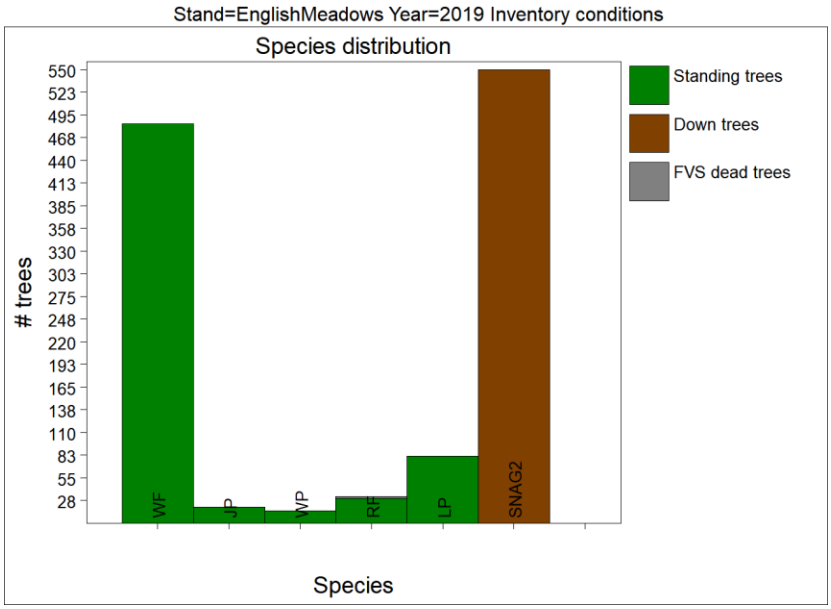
The middle tier is comprised of co-dominants, saplings, and suppressed trees which range in age from 25 to 125 years of age. The basal area of this tier is from 20 to 55 square feet. The trees in this tier are generally healthy with some infestations of dwarf mistletoe. The bottom tier is comprised of seedlings (mostly white fir) ranging in height from 1 to 8 feet.

These JPN stands vary in basal area per acre of 10 to 90 square feet in the merchantable 12" to 44" diameter range with an average 65 sq. feet per acre. The QMD is 9” with approximately 383 trees per acres representing approximately 17 Mbf per acre. The sub-merchantable 2" to 10" conifers average 5 square feet per acre with an average 197 trees per acre.

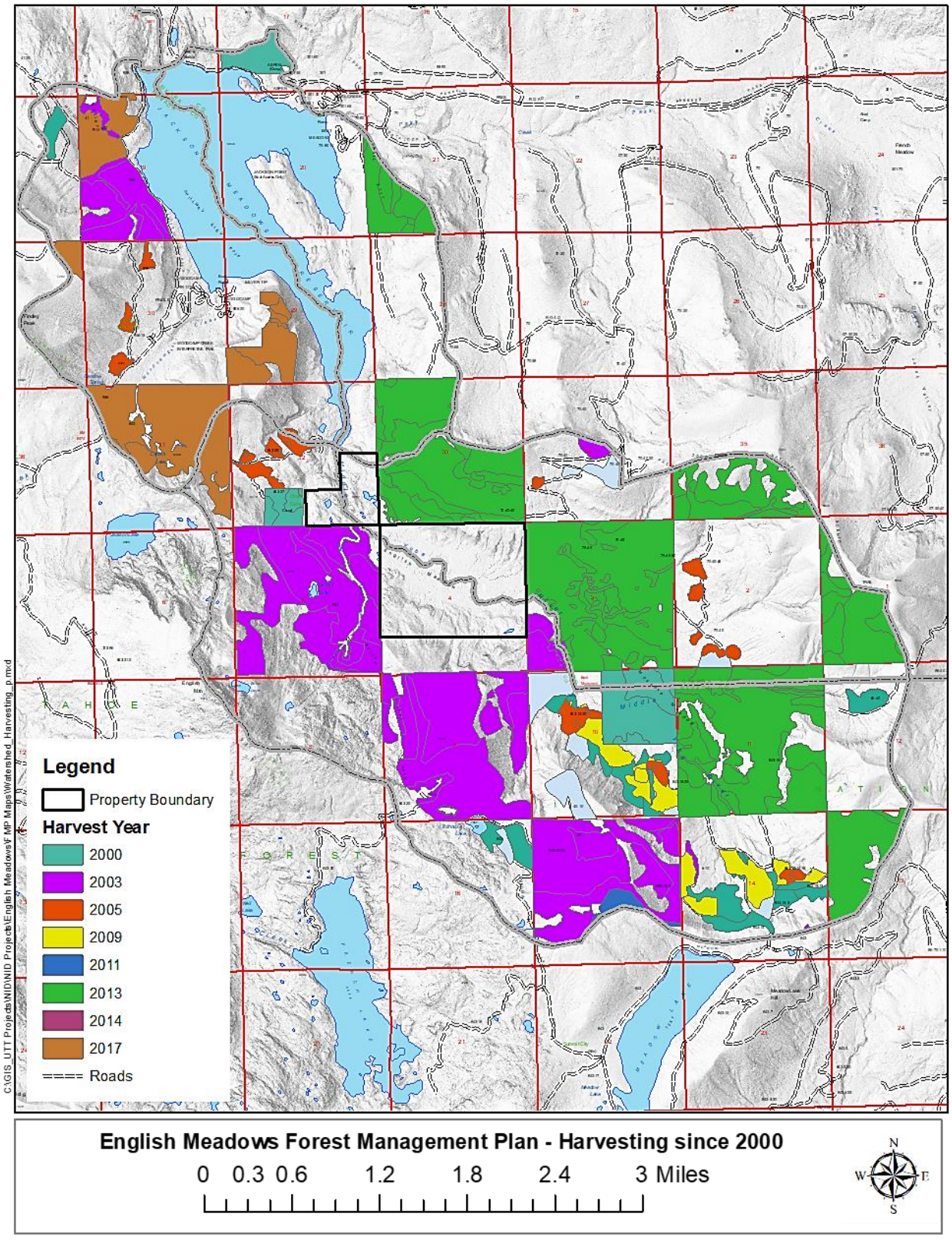
A pure Lodgepole Pine (LPN) stand surrounds English Meadow. The Lodgepole ranges in age from seedlings to 130 years. The basal area within this stand varies from 40 to 140 square feet of basal area with an average of 70. The QMD is 11" with approximately 263 trees per acres representing approximately 21 Mbf per acre. The sub-merchantable 2" to 10" conifers average 15 square feet per acre with an average 189 trees per acre.

Projected growth: Growth projections from the FVS model, and Site tree projections show that current basal area stand growth ranges between .7 and 1.7 ft²/acre/yr., which is equivalent to a range of roughly 205 to 410 board feet/acre/yr. Scribner short-log scale based on the average stand diameter and trees per acre.

Figure 1: Forest Vegetation Simulator Model Current Stocking Level Output



Map 10: Past Management within the Watershed



Pests and Disease

Insects, diseases, plants, and animals can damage trees and other forms of vegetation. Damage includes mortality, reduced growth, reduced tree quality, top killing, degradation, and reduced quantity and quality

of seed production. If the damage affects the attainment of land and resource management goals and objectives, the destructive agents are considered pests.

Pest damage can vary by year and by place within a forest. Damage is frequently the result of several pests and environmental factors acting together, rather than the result of a single pest. Common insect and disease complexes that occur in forests include root disease-bark beetle and dwarf mistletoe-bark beetle. Damage from these pests is often accentuated during severe environmental conditions, such as drought, and by certain stand conditions, such as overstocking. In general, these pests, along with their natural enemies (parasites and predators), are a part of the environment and have adapted to exploit certain ecological niches or conditions during a forest's development. In addition, pocket gophers can cause damage to reforestation acres.

Forest management activities should concentrate on thinning existing stands and creating stands of varying species and age classes. This will serve the purpose of isolating outbreaks to smaller areas and make control more realistic as well as removing the large uncontained habitats needed for these problems to reach epidemic levels. It is also advisable that periodic surveys of the property be conducted so that problems can be treated before they get out of hand.

Insects

In forestry, insect-caused damage is quantified in terms of land use efficiency such as reduced yield or quality of a resource and increased costs associated with providing that resource. Forest entomology is concerned with the detection, identification, forecasting, and measurement of injurious insect populations; assessment of insect caused damage, analysis of outbreak causes, and development and application of procedures for the protection of forest resources.

A common way of characterizing forest insect pests is by their feeding preference. There are defoliators, phloem and cambium feeders, wood borers, etc. All parts of a tree are subject to feeding damage. Damage can occur to an individual tree or to many trees across the landscape. Ultimately, the impact of damage and level of response depends upon management goals for the property.

Bark beetles, family Curculionidae (subfamily Scolytidae), under favorable stand and climate conditions are the most destructive group of insects in coniferous forests of the West. Besides killing trees and breeding in the cambium of freshly felled trees and slash, some species bore pinholes through the sapwood of green logs and seriously reduce economic value. Other members of the group are secondary in their attacks (only infesting trees that have been attacked by other primary bark beetles), and some breed only in dead wood. There are hundreds of species of bark beetles found in the conifer forests of the West occupying a variety habitat ranging from cones to tiny branches to the main stems of their hosts.[3] **[See Appendix 2, Pests and Disease Descriptions]** for detailed symptoms.

[3] US Forest Service, Region 5, Forest Health Protection and the California Department of Forestry and Fire Protection, Forest Pest Management forest health specialists. California Forest Insect and Disease Training Manual. 2015

Pest and disease management considerations

Removal of infected trees **-** Heavily infected trees are more susceptible to successful fir engraver attack. Removal of these trees reduces the potential for buildup of insect populations in the stands and also lowers overall stocking levels to concentrate moisture and nutrients toward healthier trees.

Overstory removal of infected trees **-** When the overstory is heavily infected and their number limited, the most benefit may be gained by removing these trees. This will eliminate the overstory source of infection, allowing the understory of the same species to grow without constant exposure to dwarf mistletoe seed. It may also increase the amount of light, moisture and nutrients available to the understory.

Regenerate with non-hosts **-** When it is desired to maintain an infected overstory, but an understory is also needed for future replacement trees, it is advisable to regenerate with species that are not host to the dwarf mistletoe species that is present. It may be necessary to remove some overstory trees to allow light to penetrate to the understory and permit adequate growth. In this case, if possible, it is advisable to remove the more severely infected overstory trees.

To mitigate any potential adverse impacts from vegetation management activities. All brood material should be treated. The following treatment is acceptable, provided it is completed as soon after brood material creation as is practical. The specific treatments to be applied to brood material are as follows:

- All slash will get treated within one week after it has been created. Slash will be chipped, burned or removed.
- Lop all branches from sides and tops of those portions of main stems, which are 3” or more in diameter and cut into short segments, four feet or less. Branches shall be scattered so that stems have maximum exposure to solar radiation.
- Do not pile slash unless it has dried for at least 4 weeks.

Decay or rot in wood is caused by fungal disease. In their effect on wood there are two broad classes of wood destroying fungi. The first class, causing white rots, decomposes all components of the wood. Affected wood may contain only streaks of white pockets of various size separated by areas of firm, strong wood, or it may be reduced to a stringy or fibrous condition or a spongy mass. Generally, the wood is completely decomposed leaving a large hollow in a tree with only the sapwood remaining as support. Often these trees are overlooked as the sporophores or fruiting bodies may not be visible to the laymen. The second class, causing brown rots, decomposes the cellulose. The wood is reduced to a carbonous mass in various shades of brown. Both types of rot may occur in the same tree and either should be taken seriously when identifying hazard trees for removal.

Streams, Wetlands, Lakes and Ponds

Stream channels throughout the property range from steep headwater ephemerals to moderate gradient perennial channels. The characteristics of these varied channel types are defined by their position in the watershed, their underlying geology, the climate, and riparian and upland vegetation. This also drives the manner in which they process water flow and sediment in the watershed. Therefore, different stream types will tend to respond differently to temporal changes in sediment input or streamflow due to natural or human caused events.

There are approximately 56 watercourses within the property. The nine Class I watercourses include the Middle Fork of the Yuba River, Secret Creek, Catfish Creek, French Creek, and five unnamed watercourses. There are 13 Class II, and 34 Class III watercourses. All the watercourse eventually flow into the Middle Fork of the Yuba River.

The perennial streams alternate between low gradient pool-riffle and steeper bedrock or step-pool segments. The steep sections follow the descriptions above for the tributaries. The low gradient segments are relatively lower energy than steep segments and therefore have a lower sediment transport capacity relative to supply. This results in these low gradient segments being more sensitive to changes in sediment supply or streamflow. Increased supply or decreased runoff can result in detrimental sediment deposition while decreased supply or increased runoff can cause erosion and the streambed and banks (Montgomery and Buffington 1997).[4]

Secret Creek flows from Secret Lake approximately one-half mile west of the property. The stream supports fish due to high water flows.

Catfish Creek, similar to Secret Creek, flow from a lake approximately one-mile northwest of the property. The stream supports fish life and is generally in good condition.

French Creek contains water all year due to a small unnamed lake, which is upstream approximately one- and one-half mile southwest from the property. The stream supports fish life and is generally in fair condition. The watercourse channel has a considerable amount of aggrading and debris jamming through its reach.

The ephemeral streams are primarily steep headwater colluvial channels (Montgomery and Buffington 1997). These channels are narrow and shallow and are sometimes hard to define on the ground due to their headwater location. They experience highly sporadic fluctuations in runoff and accumulate sediment from the hillslope over long time periods (decades to centuries). They then flush such sediment downstream during infrequent high runoff events or debris flows (Montgomery and Buffington 1997). Such channels are described as transport-limited and respond to changes in sediment supply by fluctuating the amount of sediment in storage and changes in runoff by changing the frequency of sediment flushing events.

Headcutting within tributaries flowing through the meadow is a common occurrence and is further documented by the site characterization and discussion presented in the reports developed by Plumas Corporation.

At numerous locations, within the Class III watercourses, mostly within the meadow, severe downcutting has occurred. The recent downcutting is attributed to rain on snow events during winter and spring runoff.

Overall, channel segments in the project area appear stable with localized evidence of excessive erosion or deposition of sediment save for the main Middle Yuba River channel which bisects the meadow floor, and shows significant channel incision, erosion and headcutting. These areas of instability can be traced to past impacts of mining and roads or ongoing impacts from roads. Several

[4] Montgomery, D.R. and J.M. Buffington, 1997. Channel-reach morphology in mountain drainage basins: Geological Society of America Bulletin, v. 109, no. 5, p. 596-611

of the roads in the project area are routing sediment directly to the channels. In the mid 1800's, three dams flooded English Meadow to provide water for mining. The reservoir was about 2.5 miles long and 0.5 miles wide. On June 18, 1883, the primary middle dam was allegedly blown up with dynamite by ranchers. The inundation and sudden removal of the dam have left lasting impacts on the meadow, such as an incised channel and tributaries, and gravelly soil overburden on the meadow (Mink 2019). Where feasible, these issues will be addressed by the projects.

The Middle Yuba River is the primary tributary to Jackson Meadows Reservoir, which is 3/4 mile downstream of the meadow through a narrow canyon reach.

View of Middle Yuba River channel showing the cut bank, scour, and erosion resulting from frequent high flow events *(Beedy 2018)*.

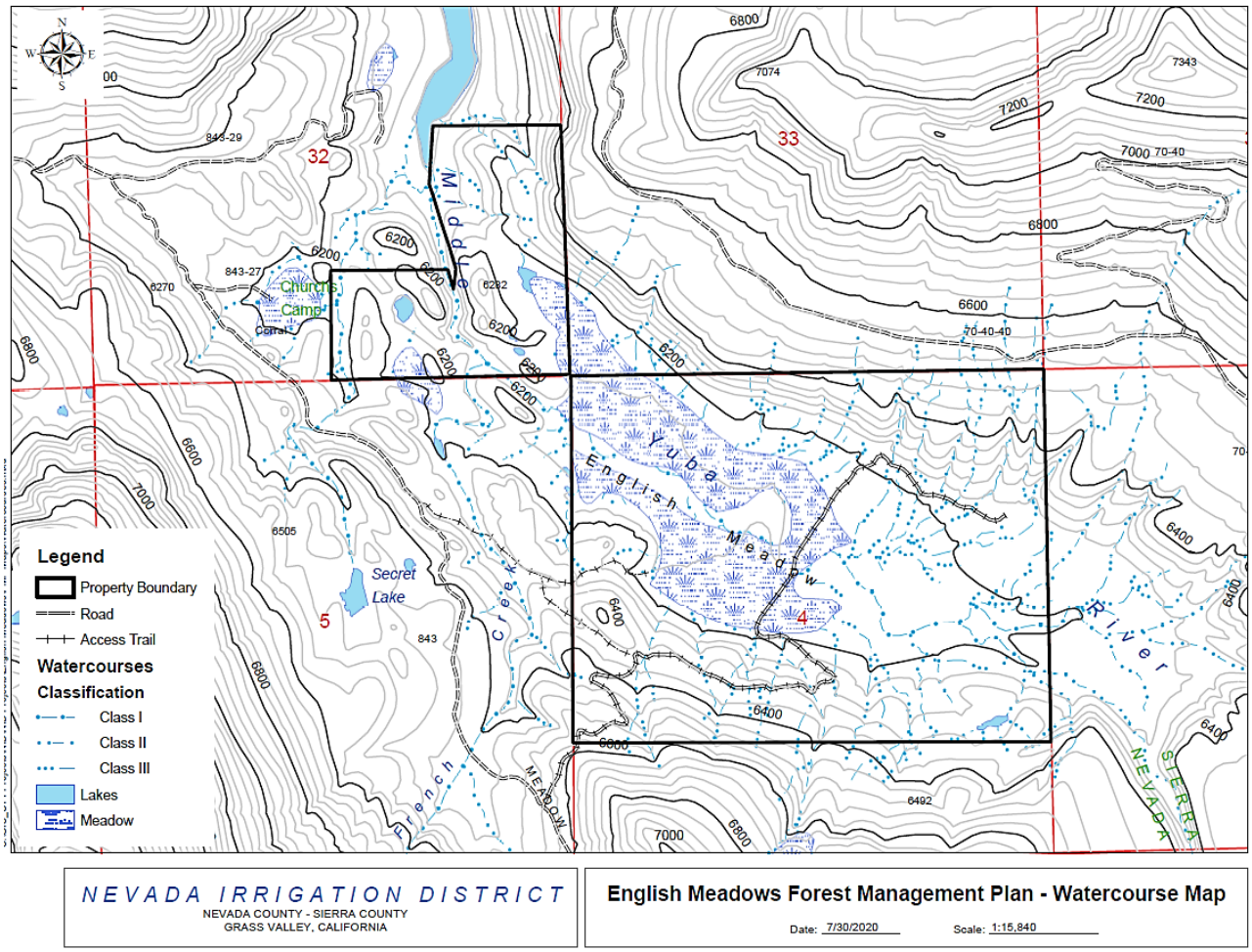
Middle Yuba River Channel: The hydrology of the English Meadow properties was assessed and presented in two reports by Plumas Corporation to develop a restoration plan and floodplain enhancement project. While this project is focused mainly on the meadow base, intermittent and perennial tributaries were mapped as well as the main stem of the Middle Yuba River.

There is one perennial tributary which flows from the south slope of the meadow and 2 additional perennial tributaries which flow from the north slope. The Middle Yuba River within the meadow experiences extremely high and extremely low flow seasonally, sometimes being completely sub-surface throughout the upper 2,466 feet, with 4,369 feet of intermittent and 4,284 feet of perennial channel. The banks of the upstream reach of the channel within the meadow experience significant erosion during high water events possibly due to the fine-grained silty clays deposited throughout the meadow during its inundation. The main stem of the Middle Yuba River is incised approximate 4.5 feet, is notably wide with little to no vegetation on the exposed cobble-gravel bars, and is estimated to have the capacity to carry a ten-year flood event. (Mink 2019).

There are two perennial channels, along with numerous smaller tributaries, that enter the Middle Yuba River from the southwest side of the meadow. One of these perennial channels drops approximately 4 feet from the floodplain into the Main channel, causing head cutting (Mink 2019).

There is other head cutting occurring at locations where tributaries enter the mainstem, as well as areas that are rapidly drained by the excavated channels.

Map 11: Class I/II/III Watercourses



Recreation

Recreation activities within 3 miles of the English Meadow properties includes: hiking, camping, fishing, boating, and 4WD, ATV and dirt bike travel. There is some evidence of ATV use within the English Meadow Basin, but all other vehicle use is restricted to Meadow Lake Road which is outside the property boundary. The Pacific Crest Trail runs along the ridge to the northeast of English Meadow. Fishing, boating and camping occur to the north around Jackson Meadows Reservoir. There are no direct trails that connect the property at English Meadow to the campgrounds around Jackson Meadows.

Threatened or Endangered Species - Plants or Animals

The English Meadows-Upper Middle Yuba River Headwaters region supports a high diversity of animals including a number of special-status species that are of concern to the California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (USFWS).

In addition to literature database review for species with potential to occur within the English Meadow Property, biological surveys for special status plants and animals were conducted throughout the area by qualified botanists and biologists.

Animal Survey

Field surveys were performed in the area by the project wildlife biologist, Dr. Edward C. "Ted" Beedy on June 20, 29, and 30, and July 13, 2018. The project herpetologist, Mr. Sean Barry, performed field surveys on June 30, July 7, August 29, 30, 2018. The project RPF, Mr. Kevin Whitlock, also made incidental wildlife sightings during many forestry surveys he made in the area during 2018.

Plant Survey

Plant surveys were conducted during the following three time periods in 2018: 1) July 6-July 9; 2) July 16 to 20; and 3) August 31-September 1 by professional botanists Dr. Michelle Stevens and Michael Dolan along with research assistant Milo Kovet. The project RPF, Mr. Kevin Whitlock, walked the site boundary and discussed potential project impact areas and mitigation strategies during the July 6-9, 2018, plant survey. Four surveys were conducted: 1) a focused surveys on June 29; 2) an intuitive controlled survey designed to cover all habitats/plant communities of the project area from July 7 to July 9; 3) an intuitive controlled survey from July 17 through July 20, 2018, and 4) an intuitive controlled survey during the late season blooming period from August 31-September 1, 2018. The surveys included a directed search for special status plants or their predicted/known habitats that would have been apparent during the time of the surveys. Rare plant surveys followed the Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species (BLM 2009).

In 2019, botanical surveys of the English Meadow-Upper Middle Yuba Headwaters Project in Nevada and Sierra counties were conducted by the same qualified botanists on July 29 and July 30 to inventory species present at the time of the survey and assess the presence or potential for occurrence of sensitive and priority plant species within the project area.

For the Special Status Plant Resource Evaluation and Animal Resource Evaluation reports [See Appendix 3, Biology].

Special-status plants and animals are species that are legally protected under the State and Federal Endangered Species Acts, and other regulations, and species that are considered rare by the scientific community. They are defined as:

- Plants and animals that are listed or proposed for listing as Threatened or Endangered under the California Endangered Species Act (Fish and Game Code 1995 §2050 et seq., 14 CCR §670.1 et seq.) and/or the Federal Endangered Species Act (50 CFR 17.12 for

plants, 50 CFR 17.11 for animals; and various notices in the Federal Register for proposed species).

- Plants and animals that are Candidates for possible future listing as Threatened or Endangered under the Federal Endangered Species Act (50 CFR 17.12 for plants, 59 FR 58982 November 15, 1994 for animals).
- Plants and animals that are considered Federal Species of Concern (formerly C2 candidate species).
- Plants and animals that meet the definition of rare or endangered under CEQA (14 CCR§15380), which includes species not found on State or Federal Endangered Species lists.
- Animals that are designated as "Species of Special Concern" by CDFW (1999).
- Animal species that are "fully protected" in California (Fish and Game Code, §3511, §4700, §5050 and §5515).

Special-status plant species also include species on the California Native Plant Society (CNPS) Inventory List 1A (presumed extinct in California), List 1B (plants rare, threatened, or endangered in California and elsewhere), or List 2 (plants rare, threatened, or endangered in California, but more common elsewhere). These species fall within state regulatory authority under the provisions of the California Environmental Quality Act (CEQA) Guidelines. CNPS Inventory List 3 (plants about which more information is needed, a review list) and List 4 (plants of limited distribution, a watch list) are considered to be of lower sensitivity, and generally do not fall under specific state or federal regulatory authority. Specific mitigation considerations are generally required for species with federal or state protection or that are in List 1 and 2 categories.

Sensitive plant communities include habitats that fulfill special functions or have special values. Natural communities considered sensitive are those identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife (CDFW). CDFW ranks sensitive communities as ‘threatened’ or ‘very threatened’ and keeps records of their occurrences in its California Natural Diversity Database (CNDDB). Also, CNDDB vegetation alliances are ranked 1 through 5. Alliances ranked globally (G) or statewide (S) as 1 through 3 are considered sensitive (Sawyer, et.al. 2009). Impacts to sensitive natural communities identified in local or regional plans, policies, regulations, or by CDFW or U.S. Fish and Wildlife Service (USFW) must be considered and evaluated under CEQA.

Sensitive habitats include areas that fulfill special functions or have special values, such as wetlands, streams, and riparian habitat. These habitats are regulated under federal regulations (i.e. the Clean Water Act), state regulations (such as the Porter-Cologne Act, California Department of Fish and Wildlife’s Streambed Alteration Program), and local ordinances or policies.

Fire Risk and Hazard Severity

Wildfire is a frequent and often natural process throughout much of California. Where fires once frequently and lightly burned, they now have become catastrophic landscape events, often threatening life and property.

The term fire behavior is used to describe the magnitude, direction, and intensity of fire spread. Factors that influence wildland fire behavior are: fuel, weather, and topography. Interaction of these three factors affects a fire's direction of travel, how fast it spreads, how intensely it burns, and, consequently, how much effort it takes to control the fire.

Fuel is the only element that can be manipulated to change fire behavior. Successful fuel management to reduce fire intensity and rate of spread, requires efforts be spent on decreasing the volume of fuel and increasing the separation or arrangement of the fuel. Fuels management, however, may have little impact on spread during periods of extreme weather.

Fuels management is the treatment of plants and litter to reduce the frequency, rate of spread, and size of wildland fire. Fuels management is a proactive approach to reducing wildfires and their intensities as opposed to the reactive approach of fire management. A realistic objective for fuels management is to reduce a fire's rate of spread and other undesirable fire behavior. Fuels management will not guarantee the prevention of a wildfire.

Fire Protection Objectives

In 1996, the Sierra Nevada Ecosystem Project reported that the medium return interval for naturally occurring fires in pre-historic times ranged from 8-30 years, depending upon the vegetation type. Most historical accounts and early day photographs indicated that forests prior to the 1850's were much more open, with less brush and fewer smaller trees. With the advent of complete fire suppression efforts by the early 1900s, the abundance of intermediate size trees and brush increased to fill the spaces between the mature overstory trees.

Most of the property occupies an area that would be difficult to access by standard firefighting equipment and personnel. Within the property, few vehicle access roads exist, except to the developed areas, and these roads are generally narrow and minimally improved.

The goal of hazardous fuel treatment is to improve forest health, enhance watershed health and wildlife habitat, and reduce surface fuel loadings and ladder fuels to a level that will allow safe fire suppression in the case of a wildfire.

Fire not only interacts with the physical, but the living components of the ecosystem. The only portion of the fire behavior "triangle" that can be intervened with is fuels by managing vegetation.[5]

Although there is relatively little understanding of the ecological effects of fuel treatments, in particular the extent to which mechanical treatments might emulate natural ecological

[5] Suihara, N., et.al., 2006. Fire in California's Ecosystems. UC Berkeley Press. 1996. Sierra Nevada Ecosystem Project; Chapter 4, Fire and Fuels, pp. 62-71.

processes such as fire[6], they can be effective tools to modify stand structure and influence subsequent fire severity and extent. These mechanical treatments are often a required first treatment in forests containing excessive fuels loads.[7]

Fire will continue to influence the landscape.

Fire Model

The property has three dominant arrangements of fuels that influence fire behavior. These are: ground, surface and crown fuels. Ground and surface fuels can be described utilizing Rocky Mountain Research Station Fuel Models[8] 10 and the 13 fire behavior fuel models[9] for estimating fire behavior. This aids in describing the type and average amount of fuel given a particular fuel type and predicting fire behavior expected under certain weather and topographic conditions. Crown fuels are generally described in relationship to the density of crowns (canopy bulk density) and their height above the surface fuels (canopy base height).

Fire plays a pivotal role in reshaping and maintaining mixed-conifer ecosystems.[10] It is characterized by the fire regime attributes that describe the pattern of fire occurrence, behavior, and effects. Temporal attributes include seasonality and fire return interval. Spatial attributes are fire size and spatial complexity of the burns. Magnitude attributes are fire intensity, fire severity, and fire type. Many species and most plant communities show clear evidence of adaptation to recurrent fire, further demonstrating that fire has long been a regular and frequent occurrence. This is particularly true in the chaparral and mixed conifer communities, where many plant species take advantage of or depend on fire for their reproduction or as a means of competing with other biota. In many areas frequent surface fires are thought to have minimized fuel accumulation, keeping understories relatively free of trees and other vegetation that could form fuel ladders to carry fire into the main canopy (Sierra Nevada Ecosystem Project [SNEP], 1996).

In general, fire behaviour fuel models are grouped into types. The property supports a National Fire Danger Rating System fuel model G or a Fire Behaviour Fuel Model 10. Fires in these models are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire.

Predicting the potential behavior and effects of wildland fires is an essential task in fire management. Mathematical surface fire behavior and fire effects models and prediction systems are driven in part by fuel-bed inputs such as fuel load, bulk density, fuel particle size, slope, elevation, aspect, cover type, heat content, and moisture of extinction. To facilitate use in models and systems, fuel-bed inputs have been formulated into fuel models. A fuel model is

[6] Stephens, S., et.al. 2009. Fire treatment effects on vegetation structure, fuels, and potential fire severity in western U.S. forests. Ecological Applications, 19(2), 2009, pp.305-320.
[7] North M., Stine P., O'Hara K., Zielinski W., and Stephens, S., 2009. An ecosystem Management Strategy for Mixed Conifer Forests. USDA Forest Service. General Technical Report, Pacific Southwest Research Station, PSW-GTR-220, March 2009.

[8] Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.
[9] Anderson, H.E., 1982. Aids to Determining Fuel Models for Estimating Fire Behavior. General Technical Report, INT-122. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 22p.
[10] North M., Stine P., O'Hara K., Zielinski W., and Stephens, S., 2009. An ecosystem Management Strategy for Mixed Conifer Forests. USDA Forest Service. General Technical Report, Pacific Southwest Research Station, PSW-GTR-220, March 2009.

a set of fuel-bed inputs needed by a particular fire behavior or fire effects model. Different kinds of fuel models are used in fire science.[11]

Fires will burn in the surface and ground fuels with greater intensity than the other timber litter models. Dead-down fuels include greater quantities of 3-inch or larger limb-wood resulting from over-maturity or natural events that create a large load of dead material on the forest floor. Crowning out, spotting, and torching of individual trees is more frequent in this fuel model. The rate of spread and flame length are moderate.

Fuel Model G is used for conifer stands where there is a heavy accumulation of litter and downed woody material. Such stands typically show signs of insect, disease, wind, or ice damage -- natural events that create a very heavy buildup of dead material on the forest floor.

5. English Meadow Floodplain Enhancement, Healthy Forests and Meadow Restoration Plan

Floodplain Enhancement and Meadow Restoration

Project Goals

This project would employ instream process-assistance techniques and progressive forestry practices at a sub-watershed scale throughout English Meadow to achieve hydrological and forest health benefits. This includes mechanical treatment, with heavy equipment, of the watershed to improve forest health, thus providing woody material for in-stream structures that will be used to slow the velocity of the Middle Yuba River Channel and reestablish floodplain and channel connectivity.

Objectives and Methods

Process-Assistance Woody Debris Jams: This project will mechanically construct woody debris jams in the mainstem of the Middle Yuba River where it flows through English Meadow, to slow the velocity of the stream and allow the mainstem of the river to access the floodplain during high flow periods. Channel modifications will utilize onsite trees, woody debris, sod, and cobble/rock.

The width of the valley floodplain, the low valley gradient (slightly less than 1%), and the lack of encroachment on the floodplain by infrastructure such as roads or buildings all make English Meadow an ideal location for a floodplain enhancement project. This treatment would involve increasing the roughness in the mainstem channel with 12 woody debris and an additional 4 jams located in the largest tributary to the Middle Yuba River. These structures are meant to slow down velocities on the mainstem and tributaries to induce natural channel aggradation of bedload material, and reduce headcutting and bank erosion. Debris jams would be constructed as whole tree jams, including fine needles and branches to trap material as it moves downstream, using approximately

[11] Scott, Joe H.; Burgan, Robert E. 2005. Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. Gen. Tech. Rep. RMRS-GTR-153. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 72 p.

12 trees that are 6” - 30" diameter per jam. Channel bed cobbles and sod will be incorporated into each jam, and the project will also fill six excavated ditches on the northeast side of the Middle Yuba. Restoration of channel connectivity to the meadow floodplain will conserve the key natural processes of infiltration, aquifer recharge, seasonal release of water, and water filtration. These improvements will benefit water quality, habitat quality, and the resiliency of the meadow ecosystem to climate change or other disturbance.

Hazardous Fuels Reduction by Mechanical Thinning: Mechanical treatment will be used to masticate and chip approximately 175 acres of excessive downed woody debris and lodgepole pine on the slopes adjacent to English Meadow, and approximately 200 acres of encroaching lodgepole pine within the meadow. Our approach incorporates forest management for optimal species diversity, habitat protection, forest stand age heterogeneity, increased snowpack accumulation, reduced competition for resources, reduced wildfire risk, and mitigation of impacts to special-status wildlife species extant throughout the project area. These changes are achieved through careful on-site management by the project forester, and by actively adhering to recommendations of project biologists as well as state and federal law. Forest thinning immediately adjacent to the meadow will reduce catastrophic wildfire risk, improve forest resilience, increase snowpack and water delivery, and provide benefits to the meadow, downstream habitats and water supply. Lodgepole pine within the meadow boundary will be utilized to construct the woody debris jams for the meadow restoration phase of this project.

Within the meadow we will treat 200 acres of encroaching conifers, retaining 3-7 large trees for snag recruitment. The meadow silvicultural treatment is based on elevation, slope, soil type and existing conifer stand conditions. All conifers less than 24” Diameter at Breast Height (DBH) will be removed within the meadow and along the meadows edge. All hardwoods will remain. Trees larger than 24 inches that are considered a seed source for future encroachment and will be girdled to provide wildlife habitat and the connection between terrestrial and aquatic species. Existing large snags within the meadow, along the meadows edge, will not be removed unless deemed necessary to complete treatment activities. Lodgepole pine and white fir will be the trees selected first for removal.

In addition to meadow treatment, a varying width buffer will be thinned to reduce future conifer seed source into the meadow, act as a fire-control measure, and increase snow load for improved water yield and duration. In addition, the thinned buffer will allow for optimal control of prescribed fire within the meadow in the future. The desired effect will be:

An increased amount of water in the snow pack as there is an increased area for snow load; different sublimation and evaporation patterns; different melting rates and patterns; different precipitation related soil recharge; different water use by tree species; improvements in meadow resilience to changing climate conditions; healthy stands of willow, alder and aspen in appropriate places within and adjacent to meadows.

English Meadow Selective Thinning

Project Goals

This treatment will employ mechanical (cutting with chainsaw) or natural tree mortality analogue techniques (girdling) to remove excess large trees from the valley bottom and the slopes of English

Meadow to achieve forest health and ecological services benefits. This project would follow understory thinning projects to ease access of crew and equipment. Due to the remoteness of the project site it is not financially feasible to commercially thin and sell the timber at this time, however if biomass utilization becomes viable, we may consider this as part of the treatment plan.

Objectives and Methods

Mechanical Release

This method involves felling trees completely with a chainsaw to achieve a minimum of 30-foot spacing between trunks and canopy within the residual stand. Downed logs will either be left where they fall or cut into rounds. Material will be left on site to provide habitat for small mammals, reptiles, and amphibians as well as to slowly release carbon back into the soil.

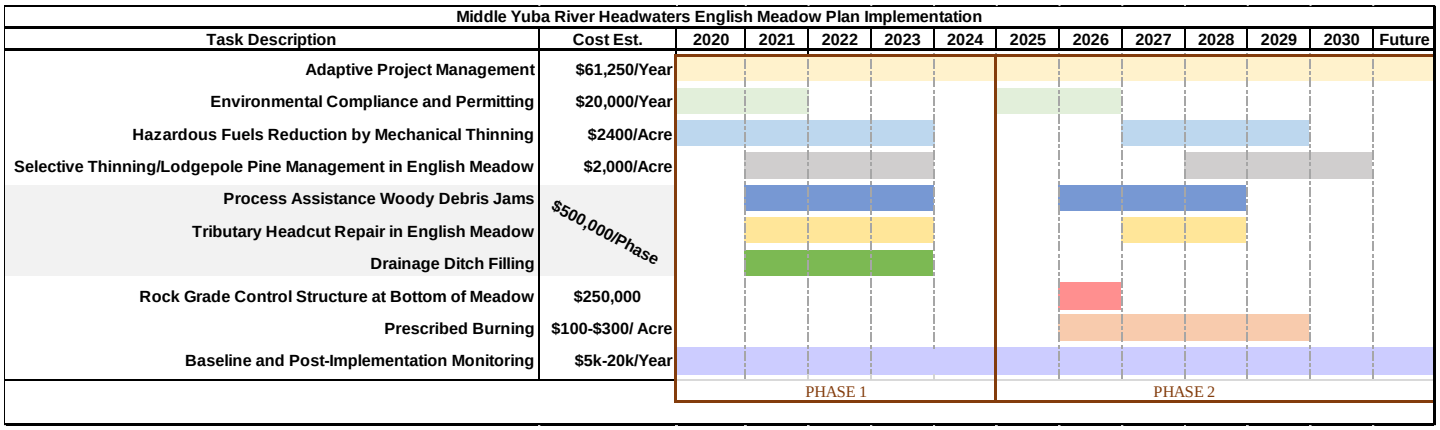
Natural Tree Mortality Analogue Techniques

This method involves either wrapping cable around selected tree trunks or girdling (cutting a ring around the trunk) to eventually induce mortality by restricting growth and disrupting the cambium layer. By these means, the desired residual spacing can be achieved over time, and without making drastic changes to the stand in a short period of time. As the girdled trees grow outward, the cambium (living) layer of the tree will be disrupted, killing the tree while it is still standing. Given enough time the trees will either fall or remain standing to create cavity nesting habitat as snags. Trees that fall will provide habitat for small mammals, reptiles, and amphibians as well as slowly release carbon back into the soil.

Potential for Piling and Burning, or Prescribed Burn

If it is determined that the risks of leaving material on site outweigh the benefits of its removal when it comes to the risk of extreme wildfire, some or all downed woody material can be piled and burned on site to safely remove excess fire fuels from the landscape. Following initial treatment of the forested slopes, prescribed fire techniques may also be considered to maintain the treatment without the use of heavy equipment. Prescribed fire will only be used where safety and state regulations permit, and will only be implemented by qualified professionals.

Figure 2: English Meadow Floodplain Enhancement, Healthy Forests and Meadow Restoration Project Schedule



6. Forest Treatment and Required Permits

While this plan is intended to be relevant for a ten-year period, it is important to recognize that natural resource management is a dynamic process and will require adjustments and updates as time progresses. This may be due to changes in environmental conditions such as insect infestations, fire, snowstorms, and/or drought. By implementing the specified recommendations in a timely manner, and conducting evaluations of your progress at yearly intervals, you can avoid the expense of developing a new plan every ten years.

The resulting stewardship recommendations are generally based on the premise that the relative ecological quality and/or sensitivity of an area will dictate what long-term land uses are most appropriate. When suitable land uses have been identified then appropriate stewardship practices can be designed to achieve your specified objectives.

- Conduct Forest Stand Improvement practices such as release, slash disposal in the targeted areas.
- Maintenance measures should be implemented on project areas at least once every 3 years (or as necessary) to maintain the desired end-state conditions and shall include growth model simulation
- When necessary, re-mark all property boundaries.
- Every year evaluate the progress of your Forest Management Plan implementation and revise the plan as needed.
- Landowners should employ Best Management Practices (BMPs) to minimize soil erosion and water pollution. These BMPs include recommendations for runoff diversion structures for forest roads and skid trails, streamside buffer zones, contour operations, and regeneration activities.

Desired Condition

There are two related goals of the old forest and associated species conservation strategy, which are to: a) protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve species associated with these ecosystems while sustaining long term water supply,

water quality, wildfire resilience, and outdoor recreation opportunities; and b) increase the frequency of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape. A key element in this strategy includes: a proactive approach to improving stand health and vigor with management objectives to reduce susceptibility of forest stands to insect and drought related tree mortality by reducing stand density. Vegetation within the proposed future project areas should be modified to meet desired surface and ladder, and crown fuel conditions as well as stand densities necessary for healthy forests during drought conditions.

Desired conditions for the general forest allocations are identical to those described for the old forest emphasis areas.

- Forest structure and function generally resemble pre-settlement conditions.
    - 25-30 feet of space between trunks and crowns of conifer trees.
    - Undergrowth and brush occur in patchwork, rather than uniformly dense across the landscape.
- Multi-tiered canopies particularly in older forest provide vertical heterogeneity.
    - Species and age heterogeneity.
- Where possible, areas treated for fuels provide for the successful establishment of early seral stage vegetation.
    - Grasses, forbs, and shrubs
        - Natural erosion control, wildlife habitat, conifer regeneration mitigation.

Harvest Documents

Most commercial biomass removal activities need a CAL FIRE permit or other entity permit. Other agency permits may be necessary for proposed management activities related to other types of conservation projects such as but not limited to water drafting, ponds, road maintenance, crossing replacements and dust control. **[See Appendix 4, CAL FIRE List of Harvest Documents].**

Additional CEQA/NEPA Notification for Ground Practices

Any future ground practice to implement these projects using public entity reimbursement funds requires CEQA and / or NEPA compliance. As such, a process of "discovery" or survey for unknown values along with a discussion of possible mitigations is required.

Provide a project notification to the following agencies:

- County Clerk
- CA Department of Fish and Game
- Regional Water Quality Control Board
- If the project adjoins public land (for example, the US Forest Service, US Fish and Wildlife Service, BLM, National, State, or local parks, etc.) notify that agency

- If the project adjoins a State Highway, contact CALTRANS
- If the project is in the Coastal Zone, contact the Coastal Commission

For ground-disturbing projects, provide a project notification to:

- Native American Heritage Commission
- Tribal contacts
- Local Historical Society

For a list and descriptions of additional regulatory agencies that may be involved in the permitting process **[See Appendix 5, Additional Professional Assistance]**

Types of Treatments

Release / Understory Fuels Treatment

This practice involves removal of non-commercial tree species, shrubs/brush or grasses that are competing with existing commercial tree species. This practice also reduces the potential of damage from wildfire, pests and moisture stress; restore natural plant communities; achieves a desired understory plant community; improves aesthetics and open space values; and improves wildlife.

Release operations can take place throughout the year, except under the following conditions:

(a) Weather predictions indicate a hazardous fire condition warranting curtailment of operations. (b) When ground conditions are such that machine operations could cause resource damage. (c) When the forester determines that adverse weather has made access or project production too dangerous or that continued vehicular travel would cause unacceptable road damage.

A release treatment can be accomplished by mechanical mastication, brush raking, pushing with a bulldozer, and/or hand cutting. The primary objective for this treatment is to release the healthy commercial species from the competing brush. The increased health of the residual stand will improve forest resource protection. In addition, by removing these surface and latter fuels, the potential for catastrophic fire and watershed damage will be decreased.

Pre-Commercial Forest Thinning

Mechanical thinning involves the use of ground-based and aerial (cable) mechanical equipment. Mechanical harvest with ground-based equipment would be conducted on slopes generally less than 30 percent. The potential direct effects of mechanical, ground-based equipment on soils include a reduction in soil cover; an increase in compaction due to the building of new and the reopening of existing, temporary roads, skid trails, and landings; soil displacement during skidding operations; and a loss of nutrients and organic material through removal of small material, such as tree tops and limbs. The potential direct effects of the harvest on hydrology and water quality would depend on how much ground is detrimentally

compacted, how much cover is removed, steepness of the treated slopes, and the proximity to stream channels.

Ground-based equipment would be operating on slopes with a gradient of generally less than 30%. The slope limitations for each unit were determined based on soil erosion hazard rating, topography, and proximity to streams. There should be minimal alteration of drainage patterns, because runoff would be dispersed by implementation of effective erosion control structures on roads, skid trails, and landings. The harvest operation as proposed should have little direct effects on soil productivity, water quality and/or quantity or flow regime.

The potential indirect effects of the harvest operation include increased risk of erosion due to isolated removal of soil cover and increased compaction resulting in greater overland flow caused by reduction in infiltration and soil water storage. The ground-based harvest operation has the potential to indirectly affect hydrology and water quality by increasing water yields, peak flows, and the timing of runoff by compacting forest soil and decreasing transpiration. The amount of cover removed should not increase the risk of erosion. Maintaining slash on skid trails and implementing effective erosion control structures would reduce erosion from compacted skid trails. The harvest operation as proposed should result in a minimal increase in the risk of erosion. The treatment prescriptions as proposed would not remove the amount of basal area necessary to generate increases in water yield or peak flow. The hydrologic effects in areas treated with the primary prescription are expected to be minimal. The effects of compaction on water yield should be minimal when management recommendations are followed. Slash left in the harvest areas would be distributed over the landscape and decrease overland flow of water. Grass, shrubs, and herbaceous ground cover would quickly establish or reoccupy harvested areas. Remaining canopy cover and expected revegetation would aid in reestablishing infiltration rates. Roots of residual and newly established vegetation would hold soil masses together and provide for erosion control.

Slash Disposal

Mastication, piling and burning, and/or chipping the material should treat slash created from fuel reduction activities. Resulting material from mastication or chipping should be left on-site to provide ground cover. The objective of the treatment is to treat the existing and resulting slash from the release treatment to reduce the potential fire hazard.

Slash is the woody debris (residue) of cut trees, pruning, and brush left after release treatments. A minimum of 95% of the entire work area should be treated by this method to effectively reduce the fuel hazard.

Pine slash created as a result of fuel reduction work should be lopped within 1 week of its creation. All branches and stems 3 inches in diameter and larger should be lopped into segments no longer than 4 feet. The potential brood material should then be left scattered on the ground so the material will be exposed to maximum solar radiation. The material should not be piled until the wood beneath the cambium layer is dry to a depth of at least ¼ inch. In areas receiving treatment by mastication, treatment of pine slash is not a concern.

Piling of slash should be done no more than 45 days after its creation or as soon thereafter as drying of pine slash, as described above, allows. Subsequent burning is to occur as described below. In areas receiving treatment by mastication, piling of slash is not a concern.

Hand or tractor piles areas to be burned during the winter period. The piles and concentrations should be allowed ample time for sufficient drying and should be burned during the first wet fall or winter weather or other safe period following piling and according to applicable laws and regulations. Burning should be as complete as possible to allow ease of movement for other follow-up work. Piles and concentrations that fail to burn sufficiently to remove the fire hazard should be further treated to eliminate that hazard.

Following initial treatment of brush, some re-growth, re-sprouting, or reoccurrence should be expected. Maintenance following initial treatment must be practiced to ensure success and prolong life of initial treatment.

The removal and/or thinning of the lower canopy in effect removes the ladder fuels that can provide the means for surface fires to "climb" into the overstory canopy. In areas where there is a significant amount of ladder fuels present, hand piling and burning will be used to remove excess material. In areas where shrub species are the dominant vegetation cover, under-burning will be used as a means of restoring fire back into a fire dependent ecosystem, to improve forest health, to reduce accumulations of dead and down fuels and small diameter decadent live fuels and rejuvenate these shrub fields to provide more high-quality forage for wildlife. In areas where there are lower amounts of ladder fuels and/or smaller areas, hand cutting will be used to open or separate the lower canopy from the mid to upper level canopy. Typically, these areas have lower levels of surface fuels.

Prescribed Burning

After completion of mechanical treatment, the potential for introducing prescribed burning to the project area will be explored. If deemed viable, a burn plan will be written and fire will be reintroduced to the landscape as an ecosystem restoration technique and a management tool for long term forest health.

Monitoring

Management of the vegetation is accomplished by doing a combination of regular and on-going maintenance and by implementing specific projects. *Monitoring of regular maintenance has to do with making sure that: 1) work is being performed where, when, and how it is supposed to be done; 2) the work being done is having the desired results; and 3) any necessary adjustments are made to the maintenance action(s) in the future if intended goals and objectives are not being met.*

Periodic monitoring and seasonal inspection should be on-going to detect problems at the earliest possible stage.

The long-range cost projections for implementation should be adjusted on an annual basis, as well as at the completion of each major phase of work. The program for implementation could

be adjusted annually depending upon availability of funds - specific tasks could be increased or decreased for a particular year, and a prioritized work program will be regularly updated to be responsive to changes in funding and ensure a proactive approach to implementation.

Evaluation of the effectiveness of on-going and routine site maintenance, or measurement of the change over time, should be done by staff or a designated representative each spring for three seasons to assess how well vegetation management goals and objectives are being met.

Monitoring is only effective if the results are incorporated into the on-going management of the property.

Some Required Components of Monitoring Plans:

- Clearly stated Goal(s) of the project.
- Clearly stated Objectives of project.
- Performance Standards: must be measurable, quantifiable indicators of performance of the project relative to the stated goals and objectives (is the project doing what you said it would or wanted it to do?).
- Monitoring Methods: how often, when, what data to collect and how; description of report format; identification of who gets the report and when do they get it.

It should be noted that common sense should dictate which parameters to draw upon in assembling an appropriate and effective project-monitoring plan.

7. Management Considerations and Best Practices

The proposed forest improvement treatments will maintain forest health and long-term carbon sequestration, decrease wildland fire potential, maintain and improve water supply and quality, improve wildlife habitat, and provide jobs to the local economy in an efficient manner.

Soils – Erosion Control

Avoid disturbance of surface for nutrient protection. As most of the organic nutrients of the soil are found in the surface leaf litter and in the top few inches of soil, disturbance to this zone should be kept at a minimum to insure continued productivity of the soil. It is important to provide for replenishment of the nutrients in this zone, especially following removal of vegetation.

Management practices:

- Retain a mixture of conifers and hardwoods as this enhances leaf litter decomposition.
- Allow foliage and limbs of trees and shrubs that are cut to rot into the ground as these portions of the plants contain the majority of the nutrients in the plants.

Avoid disturbance of surface for erosion control. The most obvious cause of soil degradation and consequent loss of soil productivity is from soil erosion. Soil erosion is a constantly occurring natural event which can be greatly aggravated by human disturbance. In mountainous areas road building, vegetation removal, and fire are the main causes of accelerated erosion. Whenever soil is exposed to rainfall impact and/or water is concentrated on bare soil erosion will increase.

Management practices:

- Maintain a continuous vegetative cover or at least minimize disturbance to the ground cover (leaf and twig cover).

Use best management practices for road design to control erosion. In general, roads are known to be the main contributors of sediment to stream systems. Sediment is eroded primarily because of drainage structures which have been improperly sized, installed, constructed, and/or maintained. Drainage structure failures are more often caused by high rainfall from summer thunderstorms which overload or plug them than from winter rainfall.

Management practices:

- Culvert design and maintenance. Install culverts of adequate size, install trash racks on culverts, keep culvert inlets free of debris, construct water-bars and rolling dips of a sufficient depth so they will not fill up with sediment or debris, keep culverts cleaned out.
- Rill or gully erosion control. Gully erosion most often occurs because of improper sloping of roads which concentrates water on the road surface or in inboard ditches, inadequate water barring for the road gradient and soil type, inadequate maintenance of water-bars which allows water to broach them, and/or rutting of the road surface (and broaching of water bars) by driving on it when it is wet. Rill erosion occurs for the above reasons plus inadequate vegetation on cut banks and fill slopes.
- General road maintenance. Most of the above causes of erosion can be minimized through regular maintenance of roads. Drainage structures should be checked periodically during the summer but especially after severe thunderstorms. Before the winter rain period all drainage structures should be inspected, cleaned out, and repaired. Ideally these should be inspected periodically during the winter. It will soon be evident where the problem spots are and corrective measures can then be taken.

Use good practices during fuels management activities. Soil disturbance from fuels management activities, including mastication, could result in the introduction and spread of noxious weeds into areas that are currently not infested, as well as the potential spread of existing infestations into new areas.

Management practices:

Invasive weeds. Invasive weeds can increase fire hazards and have adverse effects on native plant communities and the wildlife that depend on them, and on the value of agricultural lands. The most aggressive exotic plants degrade natural areas because they can exclude native species, displace natural communities, promote faunal change, reduce biological diversity, disrupt ecosystem processes, alter fire frequencies, reduce recreational values, threaten endangered species, and fundamentally alter the unique character of California.

Management practices:

- The tires or undercarriage of vehicles and equipment working in infested areas can inadvertently pick up and transport noxious weed seed and/or stolons.
- Erosion control measures such as use of contaminated straw bales and seed can also result in the inadvertent introduction of new invasive plants to the project area, which can in turn spread into adjacent undisturbed woodlands or adjacent agricultural lands or residences.
- Cattle grazing (or other domesticated animals like sheep) can influence the biological, physical, and chemical characteristics of an area. These impacts include management of vegetation, however grazing can compact the soil, alter soil nutrients, alter biodiversity, and have other undesirable impacts.

Contractor Practices. If practices are not performed properly, they have the potential for significant topsoil and nutrient loss. This often results in reduced productivity and increased off-site water pollution. Additionally, the cumulative effects of drainage projects in a region often result in reduced water storage capacity and increased downstream flooding, as well as reduced fish/wildlife habitat and species diversity.

Management practices:

Limit tractor operations. To minimize soil compaction, rutting, and gullying with resultant sediment production and loss of soil productivity, tractor operations should be limited to periods when the soil moisture content is sufficiently low that excessive rutting or other soil damage does not occur.

Mechanical equipment practices. Mechanical slash treatment involves the use of heavy equipment to clear an area of unwanted vegetation or planting obstructions. This may be as simple as masticating brush and small trees, or as major as completely clearing a site of undesirable trees and brush with a dozer. When mechanical treatment is necessary, consider these guidelines:

- Avoid removing the forest's litter layer as much as possible on slopes. This can be done by hand clearing, mastication, or using a raised dozer blade to move only woody material and avoid soil gouging. Do not expose more than 50% of the soil surface.

- Do not operate under wet soil conditions.
- Stabilize bare soil areas on cleared sites with a temporary cover crop.

Streams, Wetlands, Lakes and Ponds

Mitigate negative impacts to Wetland and Lake Protection Zones (WLPZ's)

Forest management activities have the potential to affect the hydrologic, soil, and aquatic resources by causing soil disturbance, altering vegetative cover, and changing local drainage patterns. The effects of the proposed management activities are most closely related to the harvesting and reforestation techniques used. Ground-based mechanical systems have the highest potential impacts. Applying effective Best Management Practices (BMPs) are recommended in this case to reduce the magnitude of the effects to soil, water, and aquatic resources. In addition, management requirements were developed to avoid sensitive watershed areas or minimize soil/water/aquatic concerns. The primary concern to water quality is the impairment of beneficial uses due to an increase of fine sediment caused by accelerated erosion from the proposed projects. In this case, the risk of direct effects to forest soils, water quality, and aquatic species is expected to be low in the projects proposed because project design minimizes activities that might otherwise have an impact to these resources.

Management practices:

Best Management Practices to be used. Effectiveness of the BMPs in mitigating direct and indirect effects is largely related to proper implementation and the magnitude of climatic events the first several seasons after project completion. There is a risk that heavy precipitation or rain or accumulations of snow could overwhelm erosion control structures and render them ineffective. The increased sediment delivery to channels would occur only during rare events and for short periods of time where overland flow from disturbed areas occurs. BMPs have been selected below using specific information regarding soil, slope, geology, and climate conditions typically found in the project area.[12]

To ensure recognition and protection of areas related to water-quality protection, delineate on a scale-area map or a project map any of the following:

1. Location of stream courses and riparian zones to be protected, including the width of the protection zone required for each stream
2. Wetlands (meadows, lakes, springs, and so forth) to be protected
3. Boundaries of harvest units
4. Specified roads
5. Roads where log hauling is prohibited, or restricted

[12] Luke Rutten, Hydrologist. Yuba Project, Tahoe National Forest, Yuba River Ranger District, November, 2016

6. Structural improvement
7. Area of different skidding and/or yarding method application
8. Sources of rock for road work, riprapping, and borrow materials
9. Water sources that are available for purchasers' use
10. Other features that are required by contract provisions
11. Site preparation/fuel treatment

The watercourses throughout the property are classified as Class I, II or III. To protect the quality of water in these creeks care needs to be taken to prevent sediment and debris from entering them. A buffer of undisturbed vegetation, leaf litter, and soil needs to be maintained on either side of the creeks to act as a sediment filter strip and to protect stream banks from erosion.

- Class I buffers should be a minimum of 75 feet wide on slopes up to 30%, 100 feet wide on 30-50% slopes, and 150 feet wide on slopes greater than 50%.
- Class II buffers should be a minimum of 50 feet wide on slopes up to 30%, 75 feet wide on 30-50% slopes, and 100 feet wide on slopes greater than 50%.
- Class III buffers should be a minimum of 25 feet wide on slopes up to 30%, 50 feet wide on slopes greater than 30%.

Roads - Construction

Management practices:

New road practices. New road construction should be out-sloped and with rolling dips at sufficient intervals to prevent water from concentrating on the road surface. Road slopes should be less than 10%. Culverts in draws and creek crossings should be sized adequately and where needed trash racks should be installed at inlets to keep them clear of debris and energy dissipaters should be constructed at culvert outfalls. Roads should be located so as to minimize cut and fill slopes. They should follow existing road locations whenever feasible to minimize new disturbances. Side slopes should be stabilized with willow wattles and/or other vegetation before heavy winter rains. The California Department of Forestry and Fire Protection (CAL FIRE), the Natural Resources Conservation Service (NRCS), and the Placer County Resource Conservation District (RCD) can all provide information useful in designing roads.

- Rolling dips or water bars should be maintained on all traveled roads within the property. They should also be installed on older roads and trails, which have evidence of erosion occurring. Water breaks should not exceed the following standards (based on a moderate Erosion Hazard Rating):

    - <11% Gradient – 200’
    - 11 – 25% Gradient – 150’

- 26 – 50% Gradient – 100’
- >50% Gradient – 75’

- Water breaks should be located to allow water to be discharged into some form of vegetative cover, rocks or other non-erodible material and should be constructed to provide for unrestricted discharge at the lowest end of the water break so that water will be discharged and spread in such a manner that erosion will be minimized.
- Water breaks should be cut diagonally a minimum of six inches into the firm roadbed or skid trail and should have a continuous firm embankment of at least six inches in height at the lower edge of the water break cut.
- Avoid using roads during wet periods if such use would likely damage the road drainage features. Consider gates, barricades, or signs to limit use of roads during the winter period **(Nov. 15th - April 15th)** or other wet periods.

Culvert & Ditches, and Road Conditions

Management Practices:

Culverts and ditches must be kept free of debris and obstructions. Ditches on newly constructed and/or graded roads may require frequent cleaning and checking after each major storm until re-vegetation has occurred. While clearing ditches, follow these guidelines:

- Leave grass in the ditch unless it has filled with sediment and is no longer functioning.
- Avoid undercutting the road shoulders and banks.
- Check culverts for blockage by debris.
- Do not leave a berm on the side of the road; berms will channel water down the road.

Identify and prioritize mitigation measures for existing roads that cause resource or watershed impacts. Mitigation measures may include any of the following:

a. Relocating road segments that adversely impact soil or water resources.

b. Reconstructing road segments to modify, improve, or restore road drainage.

c. Improving roads with deferred maintenance needs to current standards.

d. Improving stream crossings to accommodate bedload and debris and provide for aquatic habitat and passage.

e. Harden in road surfaces (that is, running surface or inside ditches) to prevent the generation of fine-grained surface material and/or armor portions of the road prism subject to concentrated runoff.

f. Putting roads in storage, while maintaining hydrologic and geomorphic functionality of drainage features.

g. Closing roads seasonally to protect water resources.

h. Restoring surface and subsurface hydrologic properties by removing roads from sensitive environments including riparian areas and meadows. May include relocation or decommissioning.

i. Permanently closing roads that cause significant adverse impacts to soil or water resources.

j. Decommissioning or converting unnecessary roads to other uses, such as trails. Assess risk of impact to water quality by decommissioning, placing road in storage, or converting to other use, and various treatments for each option.

The road system should be inspected prior to the summer season; problem areas should be identified and corrected.

1. Maintain road surfaces to dissipate intercepted water in a uniform manner along the road by out-sloping with rolling dips, in-sloping with drains, or crowning with drains. Where feasible and consistent with protecting public safety, utilize out-sloping and rolling the grade (rolling dips) as the primary drainage technique.

2. Adjust surface drainage structures to minimize hydrologic connectivity by:

   a. Discharging road runoff to areas of high infiltration and high surface roughness.

   b. Armoring drainage facility outlet as energy dissipater and to prevent gully initiation.

3. Clean ditches and drainage structure inlets only as often as needed to keep them functioning. Prevent unnecessary or excessive vegetation disturbance and removal on features such as swales, ditches, shoulders, and cut and fill slopes.

4. Minimize diversion potential by installing diversion prevention dips that can accommodate overtopping runoff.

   a. Place diversion prevention dips downslope of crossing, rather than directly over the crossing fill, and in a location that minimizes fill loss in the event of overtopping.

   b. Armor diversion prevention dips when the expected volume of fill loss is significant.

5. Maintain road surface drainage by removing berms, unless specifically designated otherwise.

6. Install and preserve markers to identify and protect drainage structures that can be damaged during maintenance activities (that is, culverts, subdrains, and so forth).

7. When grading roads or cleaning drainage structure inlets and ditches, avoid undercutting the toe of the cut slope.

8. Grade road surfaces in accordance with road management objectives and assigned maintenance level. Grade only as needed to maintain a stable running surface and adequate surface drainage.

9. Accompany grading of hydrologically connected road surfaces and inside ditches with erosion and sediment control installation.

10. Enforce pre-haul maintenance, maintenance during haul, and post haul maintenance (putting the road back in storage). Require the commercial operator to leave roads in a satisfactory condition when project is completed.
11. Restrict or prohibit road use during periods when such use would likely damage the roadway surface or road drainage features.

Pests

Insects, diseases, plants, and animals can damage trees and other forms of vegetation. Damage includes mortality, reduced growth, reduced tree quality, top killing, degradation, and reduced quantity and quality of seed production. If the damage affects the attainment of land and resource management goals and objectives, the destructive agents are considered pests. In addition to plants, pests, such as plague-infected rodents can also affect humans.

Pest damage can vary by year and by place within a forest. Damage is frequently the result of several pests and environmental factors acting together, rather than the result of a single pest. Common insect and disease complexes that occur in forest include root disease-bark beetle and dwarf mistletoe-bark beetle. Damage from these pests is often accentuated during severe environmental conditions, such as drought, and by certain stand conditions, such as overstocking. In general, these pests, along with their natural enemies (parasites and predators), are a part of the environment and have adapted to exploit certain ecological niches or conditions during a forest's development. In addition, pocket gophers can cause damage to reforestation acres.

Management practices:

Stand management. Forest management activities should concentrate on thinning existing stands and creating stands of varying species and age classes. This will serve the purpose of isolating outbreaks to smaller areas and make control more realistic as well as removing the large uncontained habitats needed for these problems to reach epidemic levels. It is also advisable that periodic surveys of the property be conducted so that problems can be treated before they get out of hand.

Monitor forest conditions. Continued monitoring of the forest resources for signs of insects and disease problems will need to be undertaken to reduce the possibility of insect of disease epidemics.

Fire Protection

Fire is a seasonal threat to the area (June - October). Fire risk increases on ridge tops and dry sites, in softwoods, in young trees, and with proximity to roads and neighbors. Fire risks decreases near streams and wetlands, with hardwoods, and in older timber. The greatest risk in this location is from human caused fire, in late summer and early fall.

Management Practices:

Consideration when Contracting Fuel Treatment. The provisions set forth below outline the responsibility for fire prevention and suppression activities and establish an attack procedure for fires within the property.

Contractor Responsibilities:

(1) Should abide by the requirements of the Fire Plan.

(2) Should take all steps necessary to prevent his/her employees, subcontractors and their employees from setting fires not required in completion of the contract,

(3) Should be responsible for preventing the escape of fires set directly or indirectly as a result of contract operations, and should extinguish all such fires which may escape.

Tools and Equipment

Contractor should comply with the following requirements:

(1) Should furnish and have available for emergency use on each piece of equipment used in conjunction with performance of the work as listed below, hand tools and/or equipment as follows (CPRC 4427 and 4431): (a) One shovel, one axe (or Pulaski) and a fully charged fire extinguisher on each truck, personnel vehicle, tractor, grader and other heavy equipment. (b) One shovel and one back-pack 5-gallon water-filled tank with pump with each welder. (c) One shovel and one chemical pressurized fire extinguisher (fully charged) for each gasoline-powered tool, including but not restricted to chain saws, soil augers, rock drills, etc. Shovel must be kept within 100 feet from each chain saw when used off cleared landing areas.

(2) All tools and equipment required in (1) above shall be in good workable condition and shall meet the following specifications for fire tools: (a) Shovels shall be size "O" or larger and be not less than 46 inches in overall length. (b) Axes (or Pulaski) shall have 2-1/2 pound or larger heads and be not less than 28 inches in overall length. (3) A sealed box of tools shall be located within the operating area, at a point accessible in the event of fire. This fire tool box shall contain: one 5-gallon, backpack pump-type fire extinguisher filled with water; two axes; two McLeod fire tools; one serviceable chain saw of three and one-half or more horsepower with a cutting bar 20 inches in length or longer; and sufficient number of shovels so that each employee at the operation can be equipped to fight fire

General

- Contractor should comply with all applicable laws of the State of California. In particular, see California Public Resource Codes.
- Permits Required. The Contractor must secure a special written permit from the necessary agencies before engaging in Burning (Issued by CAL FIRE and/or local fire agency and by County Air Pollution Control Districts, as applicable.)
- Regulations for Burning. Special care should be taken to prevent scorching or causing any damage to adjacent structures, trees, and shrubbery. Piles of

material to be burned should be of such size and so placed that during burning no damage should result to adjacent objects.

- Reporting Fires. As soon as feasible after initial control action is taken, Landowner and/or Contractor should notify the local Fire Agency (911) of any fires.

Understory thinning practices

There are also forested areas where the crowns of the overstory trees are touching and/or intermingled. If understory ladder fuels were to carry fire into the canopies of these trees, under the right circumstances a crown fire would result. Such fires are difficult to control and could move rapidly through dense canopies, pushed by the winds that are common during the summer. Most crown fires require surface fires to maintain the heat necessary to advance. If understory vegetation is adequately thinned, the likelihood of a crown fire developing or advancing will be reduced.

Management practices:

- All dead and dying vegetation should also be removed from the thinning zones.
- Undesirable plant species should be removed from the thinning zones due to their susceptibility to wildland fire.

Fuel modification along roads

In addition to providing travel routes, roads can act as firebreaks for certain types of fire providing control points for fire suppression. But roads are also a common location for fire ignitions. Fuel modification along roads can reduce the availability of fuels for such ignitions as well as slow the rate of spread and reduce fire intensity once fuels are ignited. This increases the time before fires build up enough energy to become difficult to control and increases the effective response time for fire control resources.

Management practices:

- Remove and treat limbs, residual slash, windfalls, live roadside brush, and small trees within, or obtruding into, the designated brushing limits (10 feet along the shoulder on both sides of the road).

Pile Burning Requirements

- Only dry, natural vegetative material such as leaves, pine needles and tree trimmings may be burned.
- The burning of trash, painted wood or other debris is not allowed.
- Do **NOT** burn on windy days.
- ***Piles must be no larger than four (4) feet in diameter and in height***. Vegetative slash be can added to the pile as it burns down. Small piles burn with less danger of scorching the crowns of the residual leave trees.
- Clear a 10-foot diameter down to bare soil around all piles.

- Have a shovel and a water source nearby.
- An adult is required to be in attendance of the fire(s) at all times.
- Cover piles with waterproof tarp /paper prior to winter
- Take all preventative measures to reduce/eliminate scorching of nearby green trees.
- Burn permits - Prior to burning the Landowner shall acquire all necessary burn permits. The Northern Sierra Air Quality Management District may also have permitting requirements, such as a smoke management plan prior to burning.

Air Resources

Fire is an important part of California ecosystems, but it also produces combustion by-products that are potentially harmful to human health and welfare. Carbon dioxide and water are the two products of complete combustion and generally make up 90 percent of the total emissions from wildfire. In incomplete combustion that occurs under wildfire conditions, smoke is composed of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons, and other organic compounds, nitrogen oxides, trace minerals and several thousand other compounds. Particulate matter is the principle pollutant of concern to human health from wildfire smoke for the short-term exposures typically experienced by firefighters and the public. Studies indicate that 90 percent of smoke particles emitted during wildland burning are particles that measure less than ten microns in size (PM10), and about 90 percent of these are less than 2.5 microns in size (PM2.5). Hydrocarbons and nitrogen oxides from large wildfires contribute to increased ozone formation (which causes injury to plants) under certain conditions (Ahuja 2006).

The Northern Sierra Air Quality Management District (NSAQMD) issues burn permits for the purposes of regulating particulate matter release amounts. Burn permits are issued for commercial burning operations, such as agricultural burns or slash burns for timber operations. Debris burning is limited to dry, woody, natural vegetation that can be burned within the permissible burn day and with limited smoke production.

Security

Theft of timber from forestlands can destroy generations of careful forest stewardship and cause irreparable environmental damage. Prosecuting vandals is expensive and convictions are often very difficult to obtain.

Landowners must take the responsibility to prevent vandalism, trespass, and timber theft on their property. Prevention is the best defense.

Management practices:

The best way to prevent timber theft, vandalism, and trespass is to protect your property with the following simple steps intended to communicate and mark forest boundaries. Most property boundaries in forests are obscure, giving timber thieves a good excuse for removing trees

through unauthorized logging. Your forest boundaries should be clearly marked with a combination of ownership signs, paint marks, posted signs, flagging, and fencing, where appropriate. Posted signs should be placed conspicuously, without creating a visual nuisance.

Posting property marks a boundary and provides an added measure of protection through state law providing a landowner's right to prohibit trespassing for any purpose. Any signs you post must be properly placed and maintained. Signs must be at least 11 inches square, include the owner's name and address, and be placed not more than 660 feet apart.

At least one sign must be set on each side of the protected area and on each side of each corner. Ideally, extra signs are placed so that one is visible wherever the boundary is crossed. Landowners must replace illegible signs within a year. If forest property boundaries are made clear, the crime of timber theft is both more pronounced and easier to prosecute.

1. Know who the adjacent property owners are. Invite neighboring property owners to double check and agree to property line. If any areas are in question, hire a professional survey crew to set the property line. Mark the line with flagging or paint only after agreed upon or professional survey. Too often, adjacent property owners play boundary tag, removing, and posting boundary limits when the other is not around. This may actually encourage timber theft activities. Discuss boundary markers, your views toward hunters, and any plans either of you may have for cutting firewood and/or cutting timber. *Trees on the property line belong to both landowners, whether or not the line is marked as a boundary. Accordingly, removal of a tree on or near a boundary line could be construed as theft.* If differences with adjoining landowners cannot be resolved, agree to a “buffer” zone in which neither landowner will harvest without further discussion and/or establish a tree-by-tree agreement.

2. Patrol your property. Forest owners should make a habit of actively patrolling the boundaries of their forestland. If there is logging activity in the vicinity, the patrols should be increased.

3. Keep in touch with neighbors about activities on their properties. Let each other know when you may plan to have any outsiders working on your property.

4. Mow and trim the grass and brush along the roadways on your property, to demonstrate a presence. Neglected or "abandoned" properties may be more tempting to a timber thief.

5. Install a chain or gate across any roads entering your property. Such a deterrent will help keep honest people honest, and dishonest people out.

Climate Considerations and Carbon Sequestration

The proposed future fuel treatment projects have the potential to be a part of a complex carbon equation and though methods to quantify potential greenhouse gas (GHG) emissions have been developed for numerous sources, the connection between potential emissions and their ultimate potential effects on or contributions to climate change and global warming have not been precisely defined. No known quantitative significance threshold exists for potential global warming impacts.

Catastrophic wildfires represent a significant carbon loss and source of GHG emissions throughout the world. By not managing the property, conditions are being created that are far

more conducive to unnatural, devastating, and destructive crown fires as opposed to conditions created and enhanced by forest management and fuel-reduction practices. Wildfires are one of the primary contributors to GHG's and may emit up to 100 tons of C02 per acre depending on forest type, density, and fire intensity (Helms 2007).

Managing forests under these conditions is challenging. In the face of uncertainty, adaptive strategies focus on three responses; resistance (forestall impacts and protect highly valued resources), resilience (improve the capacity of ecosystems to return to desired conditions after disturbance), and response (facilitate transition of ecosystems from current to new conditions).The following are some of the most relevant issues to consider when analyzing the potential effects of the proposed project in regards to GHG concerns and carbon storage of the project area:

1) Carbon Storage – Hazardous fuel treatment can help to maintain and enhance stand health and vigor, capture mortality, and shift carbon uptake to more-efficient growers. In consideration of a given stand, the amount of carbon sequestered by young trees varies between 2-6 tons of carbon per acre per year depending on species and site quality and total accumulation of carbon (and wood) in fully stocked stands will continue to rise until the stand reaches maturity (Mader 2007). Subsequently, younger managed stands sequester carbon much more rapidly than older stands which have less efficient photosynthesis and higher respiratory losses and therefore may ultimately have zero net C02 uptake but store more carbon. Recent studies have also found that the failure to account for carbon taken from C02 in the air and stored in forest products and mill residue significantly understates the total amount of carbon sequestered by California's managed forestlands (Cajun 2008).

2) Wildfire Effects - Catastrophic wildfires represent a significant carbon loss and source of GHG emissions throughout the world. By not managing the surrounding area, conditions are being created that are far more conducive to unnatural, devastating, and destructive crown fires. Wildfires are one of the primary contributors to GHG's and may emit up to 100 tons of C02 per acre depending on forest type, density, and fire intensity (Helms 2007) A recent study conducted for The Forest Foundation estimated that just four California wildfires sent 38 million tons of GHG's into the air, equivalent to 7 million cars on the road for one year in California (Bonnicksen 2008). Wildfires also remove carbon from surface soils and emit significant quantities of aerosols, particulates, and nitrous oxide and methane which are more potent GHG's than C02 (Mader 2007).

3) Insects and Disease - Insect and disease infestations create and contribute to similar impacts to the carbon cycle as wildfires and exacerbate wildfire effects when fire occurs in infested areas. Dense, slow-growing unmanaged forest stands are the most susceptible to the effects of insects and disease and subsequent reduction of stored carbon.

Experts predict that more than 21 million additional acres of western forests will suffer significant tree mortality from bark beetle attacks during the next fifteen years (Bonnicksen 2007).

4) Carbon Leakage - Leakage refers to an unintended, previously unaccounted for, and/or heretofore unknown effect on the carbon accounting process. For example, excessively restricted harvesting and management practices potentially promote excessive harvesting elsewhere and this would be considering leakage in the carbon accounting process. Leakage is considered negative when carbon management within a given project area causes compensation outside the area or causes carbon (wood as a carbon-based product) to be imported.

The State of California imports 80 percent more wood than is produced in the state (Tuttle 2007). Carbon leakage is created by the importation of wood from countries and regions where forests are not managed under the same level of comprehensive environmental guidelines and requirements as found in the U.S. and particularly in California. Part of the carbon leakage equation is also the consumption of non-renewable fossil fuels to import the product into the United States and California.

Future forest management projects have the potential to create positive carbon effects by encouraging the local production and use of timber in the market place to reduce imports and the use and consumption of less-efficient and non-renewable wood substitutes.

5) Emissions - The proposed future projects would produce minimal carbon emissions during treatment operations and emissions of GHG's would occur in the larger carbon equation during off-site transportation and manufacturing, wood product consumption, and eventual wood product decay. However, considering the complete carbon equation, the proposed project would have significant and off-setting positive effects including the reduction of wildland fire threat, increased vigor and health of the forest stand, the shifting of carbon uptake to more-efficient growers in the stand, the reduction of mortality from insect and disease infestation, providing wood as a product substitution to replace other products which are non-renewable and emit higher amounts of C02 (e.g. displacing more fossil fuel-intensive products in housing construction), providing an economic benefit to the community in the form of jobs and commerce, discouraging negative carbon leakage and encouraging positive carbon leakage, and providing a product and encouraging the growth and sustainability of the only 100% renewable and recyclable resource on the planet.

Appendix 1 – Soil Types Descriptions

ACE, Ahart-Waca, rhyolitic substratum complex, 2 to 30 percent slopes.

This soil type is found on approximately 2% of the property. The Ahart soil type component makes up 60% of this soil, and Waca making up 30% of the remaining the soil. The remaining components of this soil type are explained in detail in the ADE soil description.

ADE, Ahart-Waca. rhyolitic substratum- Cryumbrepts. wet complex. 2 to 30% slopes.

This soil type is found on approximately 13% of the property. The Ahart soil type component makes up 50% of this soil, Waca making up 30%, with the remaining 15% of the soil being comprised of Crvumbrepts.

This soil profile has a surface layer of 0-8 inches; dark brown gravely sandy loam; weak granular structure; slight acid to dark grayish brown very gravely fine sandy loam; weak granular structure. The subsoil ranges in depth from 8 to 31 inches and is comprised of brown gravelly fine sandy loam; weakly subangular blocky structure; strongly acidic. The effective rooting depth is from 20 inches to 40 inches. Available water capacity is low. Permeability of subsoil is moderately rapid; substratum is moderately slow. The soil is well drained. The Ahart series consists of moderately deep, well drained soils formed in residuum weathered from rhyolitic tuff.

AEF, Ahart-Rock outcrop-Ledmount Variant complex, 5 to 50% slopes.

This soil type is found on approximately 15% of the property. The Ahart soil type component makes up 30% of this soil, Rock outcrop making up 30%, and the remaining 25% being comprised of the Ledmount Variant soil series. The components of this soil type are explained in detail in the above ADE soil description. Rock outcrops are granitic or rhyolitic.

AQB Aguolls and Borolls, 0 to 5% slopes.

This soil type is found on approximately 26% of the property. The components of this soil type are described as 50 % Aquolls, and 50% Borolls. Surface layers of both soil types are described as thick and dark colored; with stratified coarse sand to clay. The subsoil has stratified layers with mottles and is a sandy loam to clay; some gravel. Effective rooting ranges from 10 to 30 inches. Available water capacity is variable; permeability is slow to very slow. The soil is poorly drained.

Aquolls soils have high water tables and are susceptible to flooding and puddling. Borolls soils also have high water tables during part of the year and are susceptible to puddling. In addition, the A horizon of this soil type has a heavy silt component due to the sedimentation and settling from the period when the English Dam was in existence during the mid-1800's.

CEE, Celio-Gefo Aguolls complex. 2 to 30% percent slopes.

This soil type is found on approximately 17% of the property. The Celio soil type component makes up 55% of this soil, Gefo making up 15%, with the remaining 15% of the soil being comprised of Aquolls.

This soil profile has a surface layer of 0-12 inches; grayish brown gravely sandy loam; weak granular structure; slight acid to grayish brown loamy sand; weak granular structure and medium acid. The subsoil ranges in depth from 12 to 40 inches and is comprised of a yellowish brown very gravelly loamy coarse sand; medium to strongly acidic. The effective rooting depth is from 40 inches to 60 inches. Available water capacity is very low. Permeability of subsoil is rapid; substratum is moderately slow. The Celio series consists of poorly drained soils formed in residuum weathered from glacial deposits. Gefo soils consist of deep, well drained soils formed-in alluvium and is very similar to the Celio soil type.

MHG Meiss-Gullied land-Rock outcrop complex, 30-75% slopes.

This soil type is found on 0.13% of the property. The Meiss soil types makes up 45% of this soil, gullied land makes up 20%, and the remaining 20% is rock outcrop. This soil is the same as described in MKF, with the exception of the gullied land component. Gullied land has a network of moderately deep to deep V-shaped channels. Many of these channels have eroded to bedrock and erosion may be active.

MIG Meiss-Rock outcrop complex, 30-75% slopes.

This soil type makes up 0.05% of the property. The Meiss soil types makes up 60% of the soil, with rock outcrop making up 25%. This soil is the same as described in MKF with the exception of the rock outcrop component which consists of Merhten mudflow exposures.

MKF, Meiss-Waca complex, 30-50% slopes.

This soil type is found on approximately 1% of the property. The Meiss soil type component makes up 55% of this soil, and Waca makes up 30% of the remaining soil.

This soil profile has a surface layer of 0-19 inches, brown sandy loam, moderate granular structure; to grayish brown gravelly sandy loam, moderate granular structure, medium acidity. This soil has no sub soil, but meets hard volcanic substratum at 19 inches of depth. The effective rooting depth is 12 – 20 inches. Available water capacity is very low to low. Substratum permeability is very slow. This soil is excessively drained.

MMRE Rock outcrop, metamorphic-Tinker-Cryumbrepts. wet complex. 2 to 30% slopes

This soil type is found on approximately 13% of the property. The rock outcrop, metamorphic, is 50% of this soil type. The Tinker portion, which makes up 15% of the soil type, has a surface layer which is 0 to 21 inches deep made up of a brown cobbly loam. The subsoil ranges in depth from 21 to 33 inches and is made up of a brown very cobbly loam with slight acidity. The substratum is 33 to 40 inches in depth and is a coarse sandy loam. The effective rooting depth is 22 to 40 inches. The soil is well drained and its permeability is moderately rapid. The remaining 10% of the soil type for this complex is Cryumbrepts, wet. This soil type has a dark colored sandy loam, which is gravely, cobbly or stony surface layer. The substratum is a loam or clay loam, which is also gravely, cobbly or stony in nature. The effective rooting depth is variable. The soil is poorly drained and its permeability is moderately rapid. It is present on an average of 5% slopes within the Property.

MMRG, Rock outcrop, metamorophic-Tinker-Cryumbrepts, wet complex, 30 to 75% slopes

This soil type is found on approximately 6% of the property. The components of this soil type are described in detail above. The only difference is that this soil is found on 30 to 30% slopes.

TIE Tinker-Rock outcrop, granitic-Cryumbrepts, wetcomplex, 2-30% slopes.

This soil makes up 0.01% of the property. Tinker makes up 40% of the soil, with 15% being comprised of granitic rock outcrop, and 15% comprised of cryumbrepts.

This soil profile has a surface layer that ranges from 0-21 inches, brown cobbly loam, weak granular structure, medium acidity; to thick and dark colored stratified sandy loam, silt and clay loam, gravel, cobble, or stone. The subsoil ranges from 21-33 inches, reddish brown very cobbly loam, massive, slight acidity. The substratum is pale olive and cobbly course sandy loam that is weakly cemented with silica.

VRG Rock outcrop, volcanic

This soil type is found on 0.38% of the property. The surface layer comprises the entire soil type and consists of exposures of tuff-brecca, andesite, or basalt.

WDF, Waca-Meiss complex. 30 to 50% slopes.

This soil type is found on approximately 4% of the Property. The Waca soil type component makes up 65% of this soil, and the remaining 25% of the soil being comprised of Meiss.

This soil profile has a surface layer of 0-12 inches; grayish brown gravelly sandy loam; moderate granular structure; medium acid to brown sandy loam; moderate granular structure. The subsoil ranges in depth from 12 to 32 inches and is comprised of yellowish brown very gravelly sandy loam; massive structure; medium acidic. The effective rooting depth is from 20 inches to 40 inches. Available water capacity is low. Permeability of subsoil is moderately rapid; substratum is slow. The soil is well drained. The Waca series consists of moderately deep, well drained soils formed in residuum weathered form rhyolitic tuff and andesitic mudflows.

XRE Tinker-Rock outcrop, metamorphic-Cryumbrepts, wet complex 2 to 30% slopes

This soil type is found on approximately 4% of the Property. The Tinker soil makes up 45% of this soil type, with the rock outcrop at 25%, and the Cryumbrepts comprising 20%. The remaining components of this soil type are explained in detail above.

Appendix 2 – Pests and Diseases Description

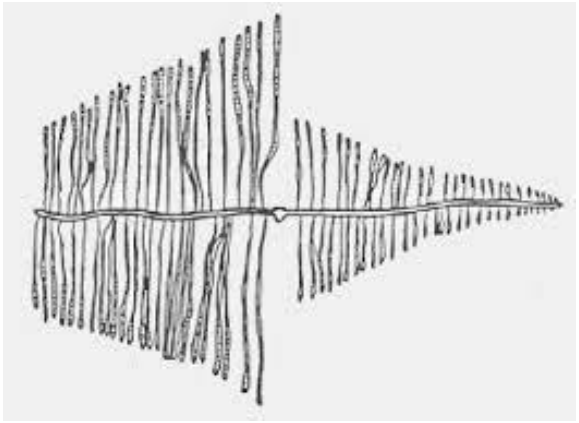
Fir Engraver Beetle

Scolytus ventralis is the bark beetle most frequently found attacking and killing true fir trees, such as white, red, and grand fir in California. Fading, reddish, and brown tops, old spike tops, and secondary terminal leaders forming new tops characterize their presence. Most species of bark beetles cannot develop broods without first killing the tree, *S. ventralis* is able to attack and establish broods only when a portion of the cambium tissue has been killed.

In many cases, this patch killing does not directly result in the death of the tree; however, trees attacked in this manner are weakened and thus susceptible to attack by other agents, such as fungal rots and secondary insects. The high degree of rot and localized defects so common to fir is traceable to attack by *S. ventralis* and the subsequent healing-over of such areas by callus tissue.

Direct control of *S. ventralis* populations is seldom warranted except in situations where high value trees may be threatened like that which exist within an urban forest setting.

Fir Engraver



Fir Engraver Gallery

Evidence of Attack – Fir engravers bore entrance holes along the main stem, usually in areas that are greater than 4” in diameter. Reddish-brown or white boring dust may be seen along the trunk in bark crevices and in spider webs. Some pitch streamers may be indicative of fir engraver attacks; however, True firs are known to stream pitch for various reasons and there is not clear evidence that pitch streamers indicate successful attacks or subsequent tree mortality. Resin canals and pockets in the cortex of the bark are part of the trees defense mechanism. Beetle galleries that contact these structures almost always fail to produce larval galleries as the adults invariably abandon the attack. Pitch tubes that are often formed when bark beetles attack pine are not produced on firs.

Adults excavate horizontal galleries that engrave the sapwood; the larval galleries extend at right angles along the grain. Attacks in the crown may girdle branches resulting in individual branch mortality or "flagging". Numerous attacks over part or all of the bole may kill the upper portion of the crown or the entire tree. A healthy tree can recover if sufficient areas of cambium remain and top-killed trees can produce new leaders. The fir engraver is frequently associated with the round-headed fir borer and the fir flat-headed borer.

Conditions Affecting Outbreaks – Fir engravers bore into any member of the host species on which they land but establish successful galleries only in those, which have little or no resistance to attack. Populations of less aggressive species like fir engraver are likely to wax and wane in direct relationship to the stresses of their hosts. Drought conditions often result in widespread fir mortality particularly in areas of low annual average precipitation. Lowered resistance of trees appears to be a contributing factor. Overstocking and the increased presence of fir on sites that were once occupied by pine species may also contribute to higher than normal levels of fir mortality.

Mountain Pine Beetle

Dendroctonus ponderosae, attacks the bole of ponderosa, lodgepole, sugar and western white pines larger than about 8 inches dbh. Extensive infestations have occurred in mature lodgepole pine forests. Group killing often occurs in mature forests and young overstocked stands of ponderosa, sugar and western white pines.

Evidence of Attack – The mountain pine beetle begins attacking most pine species on the lower 15 feet of the bole. Examination of infested trees usually reveals the presence of pitch tubes. Pitch tubes on successfully infested trees are pink to dark red masses of resin mixed with boring dust. Creamy, white pitch tubes indicate that the tree was able to "pitch out" the beetle and the attack was not successful. Besides having pitch tubes, successfully infested trees may have dry boring dust in the bark crevices and around the base of the tree. Infested trees can also have boring dust, but not pitch tubes. This may be common in drought years when trees produce little pitch. Attacking beetles transmit spores of blue stain fungi. As the fungi develop and spread throughout the sapwood, it interrupts the flow of water to the crown. The combined action of both beetles and fungi causes the needles to discolor and the tree to die.

Conditions Affecting Outbreaks – Food supplies regulate the population of the beetle. A copious pitch flow from pine trees can prevent successful attack. The number of beetles, the characteristics of the tree, and the weather affect the tree's ability to produce enough resin to resist attack. As stand susceptibility to the beetle increases because of age, overstocking, diseases or drought, the effectiveness of natural control decreases and mortality increases.

Diseases

Dwarf mistletoe

Red fir dwarf mistletoe, (*Arceuthobium abietinum* f. sp. *magnificae),* is common throughout the range of red fir in California. It is a seed-bearing plant that parasitizes only red fir. Heavily infected trees suffer significant growth losses and are subject to attack by (*Cytospora abietis),* a fungus that kills branches infected by dwarf mistletoe and further reduces growth. Because of reduced vigour, infected trees are more susceptible to diseases and fir engraver attack. Heart rots, entering through open mistletoe stem cankers can also increase mortality indirectly through stem breakage.

Several options are available to reduce the effect of dwarf mistletoe in developed recreation areas. The actual treatment prescribed depends on the current conditions of the site and upon the management objectives for the area. Available treatments include selective removal of heavily infested trees, overstory removal of the infected species, and regenerating with non-host species. These treatments are not mutually exclusive but may be combined in any particular area to achieve the desired objectives.

Cytospora Canker

Cytospora abietis is a parasitic fungus that causes cankers and dieback of true firs in the western United States. In California, white fir and red fir are most commonly attacked and damaged by this fungus. *Cytospora* attacks trees of all ages. Branch and top killing are very common, and small seedlings and saplings are often girdled and killed.

Development of the fruiting bodies takes place in the dead bark tissues. Spore production occurs in the spring and summer, usually during periods of rain or high moisture. Infection occurs via the spores produced from the fruiting bodies imbedded in the bark of an infected branch. The spores are waterborne and spread during rains. Bark beetles and other insects may also transmit the spores. Infection takes place through wounds and other openings in living branch tissues. Following infection, the fungus grows into and kills the cambium and inner bark. Elongated cankers are often produced as growth of the fungus is about twice as fast longitudinally along a branch as it is around the branch circumference.

Branches infected by Cytospora often exude resin or "pitch". Resin exudation usually appears near the margin of the living and dead tissues. Old infections, generally on large branches and trunks, show a noticeable amount of resin accumulation on the dead bark surface as well as near the canker margin. Small branches or seedlings killed quickly by *Cytospora* may show no resin exudation. The fruiting bodies are small, blister-like structures imbedded in the bark of a dead branch or in the dead tissue of a canker. They are quite small and abundant and give the bark portion of the branch where they occur a warty appearance. When fruiting bodies mature, they produce spores in great abundance. These usually occur in "spore horns", which look like small, curly, yellow threads arising from the blisters and consist of many spores held together by a sticky material. When spore horns are wet, the spores are dispersed in water.

The fungus girdles and kills most branches in about 6 months to 2 years. Large branches and boles are girdled more slowly.

The most notable symptom of infection is dieback or flagging of branches. Foliage is initially brick red in late spring and early summer and turns to light brown later in the summer and fall. Dead foliage may remain on the branches for 2 to 3 years. Flagging is particularly noticeable in stands infected with dwarf mistletoe. This disease often forms cankers.

Sunken cankers are common. Some branches, usually small ones, are girdled and killed by the fungus with no canker development. On small trees infection of the bole may occur through side branches.

Generally, *Cytospora* is a weak parasite, but it can assume epidemic proportions when trees are injured, weakened, or predisposed by adverse conditions to attack. Dwarf mistletoe also commonly predisposes both red and white fir to attack by *Cytospora.* Dwarf mistletoe swellings provide openings in the bark for infection, and a favorable environment for growth and development of the fungus.

White Pine Blister Rust

Cronartium ribicola is caused by an obligate parasite that attacks all five-needle pines and several species of *Ribes*. The fungus needs the two alternate hosts to survive, spending part of its life on 5-needled pines and the other on *Ribes.* The disease occurs throughout the range of sugar pine and western white pine to the Breckenridge area in the southern Sierra Nevada but has not been reported further south. Infection of pines results in cankers on branches and main stems, branch mortality, top kill, and tree mortality. Spores produced by the fungus in the spring on pine bole or branch cankers are wind-disseminated to *Ribes* where they infect the leaves. Spores produced in orange pustules on the underside of the leaves re- infect other *Ribes* throughout the summer, resulting in an intensification of the rust.

Following infection, the fungus grows from the needle into the branch and forms a canker. After 2 or 3 years, spores are produced on the cankers and are spread to *Ribes* to continue the cycle. Although blister rust may spread hundreds of miles from pines to *Ribes* its spread from *Ribes* back to pines is usually limited to a few hundred feet. Branch cankers continue to enlarge as the fungus invades additional tissues and moves toward the bole. Branch cankers within 24 inches of the bole will eventually form bole cankers (these are called lethal cankers). Bole cankers result in girdling and death of the tree above the canker. Cankers whose closest margins are more than 24 inches from the main bole are unlikely to reach the bole and only branch flagging will result (these are called non-lethal canker.

Environmental conditions are critical for successful infection and limit the disease in most years. Moisture and low temperatures favor infection of both hosts and must coincide with spore dispersal for infection to occur. In California, these conditions occur only infrequently, usually in cool moist sites such as stream bottoms or around meadows. In so called "wave years" when favorable conditions occur, high levels of infection can result. Wave years in California have occurred at approximately ten-year intervals in the past. As one moves from sites most favorable for rust to less favorable sites, the frequency of wave years decreases.

Appendix 3 – Biology

Recommendations

(1) If present, rare plants may be adversely affected by the heat of large burn piles and mechanical disturbance. Surveys during the appropriate blooming period are recommended in openings, along roadways and former log decks. If plants are discovered, a Special Treatment Area should be flagged around the area and an alternate site for the burn pile should be designated.

(2) If herbicide treatments are used, the DF&W recommends a foliar or stump treatment to minimize spread to non-target, potentially rare species. Minimize drift hazards by using low-volatility herbicides. If broadcast and/or pre-emergent treatments are planned, survey as described in Recommendation 1 prior to application. Ensure that the pest control advisor is aware of the potential to impact to flora and fauna when developing his/her recommendations for herbicide use. Label requirements must be followed.

(3) Fish and Wildlife Code Section 3503.5 states that it is unlawful to take, possess, destroy any birds-of-prey, or to take, possess, or destroy the nest or eggs of any such bird. The measures outlined below are recommended to avoid take of listed and non-listed raptors.

a) If operations will commence during the critical period (identified above), conduct a walk-through survey of the project area no more than 3 weeks prior to commencing operations to look for signs of nest occupancy. This walk-through survey will include

examination of the canopy trees for stick nests, cavities, and/or the presence of whitewash or prey remains or any sighting / vocalization of a territorial raptor.

b) If an active raptor or owl nest and/or a raptor exhibiting territorial actions (calling, swooping, following the surveyor, or returning to the approximate area of discovery) is discovered prior to commencing operations the following measures should apply.

(1) If a **listed** species is discovered prior to or during operations, the operator will cease operations within one-quarter mile of the discovery and contact the RPF to coordinate with DF&W for consultation.

(2) If an active nest of a **non-listed** raptor is discovered during operations, a buffer will be established at a distance that minimizes disturbance (flushing from the nest, any agitation), protected from human disturbance and access should be restricted.

The DF&W strongly encourages reporting sightings of sensitive plant and animal species.

Biologist recommendations for mitigation of impacts to special-status plants and animals

<u>Nesting Raptors and Migratory Birds (Beedy 2018)</u>

No harvesting activities can occur until after breeding season (March 1st – September 1st). A survey for raptor nests must be conducted during this breeding season. If a nest is spotted and occupied by a listed species, the timber operator must protect the nest tree, screening trees, perch trees, and replacement trees.

Vegetation disturbance must also be suspended within ¼ mile of the nest. All operations must be suspended within a 500-foot radius of the nest. Lastly CDFW and CAL FIRE must be notified to evaluate protection measures.

Terrestrial Mammals (Beedy 2018)

CDFW and CAL FIRE must be notified if any of the following mammal species are observed on the project site during activity: Pacific fisher, Sierra marten, California wolverine, Sierra Nevada Red Fox, Gray Wolf, Sierra Nevada mountain beaver. If dens or females with young are observed on the project site, operations must cease within a ¼ mile radius of observation site, and the CDFW and CAL FIRE must be notified to check protection measures. Project plan will need to be amended to account for any observed dens. Aside from the Sierra Marten which was observed in the project site on July 13, 2018, the potential for occurrence of other fur-bearing mammals within the BSA is considered low, and it is anticipated that this proposed project will not significantly affect fur-bearing mammals or their occupied habitats. No additional mitigation measures are required.

Bats (Beedy 2018)

If this pale Townsend's big-eared bat is observed on the project site, vegetation disrupting activities must be suspended within ¼ mile of potential roost structures and within a 500-foot radius of known roost sites. CDFW and CAL FIRE must be notified.

Amphibians (Barry 2018)

If either southern long-toed salamander or Sierra yellow-legged frog are observed, a buffer shall be established where all vegetation and ground disturbing activities within 10 feet of the observation and adjacent suitable stream/pond/lake habitat shall cease until the RPF consults with CAL FIRE and CDFW for appropriate protection measures.

It is recommended by Herpetologist Sean Barry that one further survey during the summer of 2019 be conducted to verify the absence of Sierra Nevada yellow-legged frogs along the Yuba River channel in the English Meadow project area, and that frog and salamander abundance should be verified prior to operation of any large equipment in the area. It is also recommended that options should be explored to prevent trout and other predatory fish from migrating upstream from Jackson Meadows Reservoir, and that the restored habitat be monitored annually for at least 5 years to ensure that the special status amphibians are detected if they attempt to colonize.

Special-status plants (Stevens 2019)

To safeguard against disturbance of existing special-status plants, project activity must not have significant impacts on the species in question. Significant project related impacts to special status plant species include: Alteration of unique characteristics of habitat such as wetlands and riparian habitats, Adverse impacts to special status species, and Adverse impacts to vulnerable resources such as special status habitats and wetlands.

Woolly-fruited sedge is a State Rank S2 (Imperiled), a California Rare Plant Rank 2B.3 (Rare or Endangered in California, common elsewhere, Not Very Endangered in California), and Global Rank G5 (Secure, Considering populations Outside California)

Starved Daisy is a State Rank S3 (Vulnerable), California Rare Plant Rank 1B.3 (Rare or Endangered in California and elsewhere, not very endangered in California), and Global Rank G3 (Vulnerable)

Mitigation of these impacts can be achieved by minimizing the sediment leaving the site during harvesting or other project related activity. It is anticipated that this project will not significantly impact any of the observed special status plants or aquatic features. Should any of these plants or features be spotted before or during activity, a buffer of 25' will be established with orange and white flagging.

CDFW's California Natural Diversity Database

The purpose of the Biological Resources Inventory is to identify potential vascular plant, invertebrate, fish, amphibian, reptile, bird, and mammal species and their habitat that potentially could exists on the property. Potentially occurring species considered in this inventory included federal and state-listed threatened, endangered and candidate species as well as species included in California Native Plant Society Lists 1-4.

The following tables are from both the Animal Resources Inventory Report conducted by Biologist Ted Beedy and Herpetologist Sean Barry; and the Special Status Plant Resource Report from Botanists Dr. Michelle Stevens, Michael Dolan and Research Assistant Milo Kovet.

Listing, Rank and Status definitions can be found at the end of the table.

Analysis of Special-Status Bird Species that may occur within the Biological Study Area				
Scientific name Common name Status Federal/State	**Habitat (*Critical Period)***	**Analysis – Project Area**	**Potential Direct, Indirect and Cumulative Impacts**	**Recommendations**
Accipiter gentilis **Northern Goshawk** **FS/MNB/CSC/CDF**	Found in coniferous and aspen forest habitats; usually nests on north facing slopes near water sources, often with meadows nearby for foraging. High tree canopy closure required for nest sites (Woodbridge and Hargis 2006). **March - August**	Extant. Confirmed observations of nesting pairs and juveniles within the BSA (Mink pers. comm., Beedy pers. obs.). A designated USFS PAC exists on the slope above the BSA in Sierra County. Other records in the project vicinity including a documented nest near Jackson Meadows Reservoir (CNDDB 2018).	High potential for direct impacts to nesting and foraging habitats; moderate potential for indirect and cumulative impacts	Prior to tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the raptor nesting season (March 1 - September 1). If an active Northern Goshawk nest is identified within the BSA, appropriate mitigation measures shall be developed and implemented in consultation with CDFW. All tree removal will be scheduled to occur after September 1 to avoid any impacts to nesting Northern Goshawks

Haliaeetus leucocephalus **Bald Eagle** **CE/CDF/CFP**	The Sierra Nevada breeding range is mainly in mountainous habitats near reservoirs, lakes, and rivers. Large nests are normally built in the upper canopy of large trees, usually conifers (Beedy and Pandolfino 2013). **January - August**	No suitable habitat for nesting within the BSA; potentially suitable foraging habitat along the Middle Yuba River. Documented nests at Milton Reservoir and Webber Lake near the BSA (CNDDB 2018). Adult observed at Jackson Meadow Reservoir in July 2018 (Williams pers. comm.).	Moderate potential for direct impacts to foraging habitats on the Middle Yuba River; low potential for indirect and cumulative impacts	Prior to any grading or tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the raptor nesting season (March 1 - September 1). If an active Bald Eagle nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.
Pandion haliaetus **Osprey** **FS/CSC/CCR**	In the Sierra Nevada nests in snags, cliffs, or other high, protected sites near reservoirs, large lakes, or rivers with abundant fish populations (Beedy and Pandolfino 2013). **March - August**	Suitable breeding habitat near Jackson Meadow Reservoir and suitable foraging habitat on the Middle Yuba River in the BSA, but no documented records in CNDDB (2018).	Moderate potential direct impacts nesting and foraging habitats on the Middle Yuba River; low potential for indirect and cumulative impacts	Prior to any grading or tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the raptor nesting season (March 1 - September 1). If an active Osprey nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.
Strix occidentalis occidentalis **California Spotted Owl** **FS/MNB/CSC**	Large old trees and snags, high basal area of trees and snags, dense canopies (>70) multiple canopy layers, and downed woody debris (Verner et al. 1992, Blakesley et al. 2010). **March – Sept.**	The BSA generally lacks suitable breeding habitat since it is primarily dominated by lodgepole pine forest and there are no documented occurrences near the BSA in CNDDB (2018).	Low potential direct, indirect, or cumulative impacts to nesting or foraging habitat since the species is unlikely to occur in the BSA	Prior to any grading or tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the raptor nesting season (March 1 - September 1). If an active nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW. All tree removal will be scheduled to occur after September 1 to avoid any impacts to nesting California Spotted Owls
Strix nebulosa **Great Gray Owl** **FS/CE/CDF**	Found in or near meadows. During the breeding season nesting takes place in the broken tops of snags or large conifer trees, 35 feet or more from the ground (Quintana-Coyer et al. 2004, Beedy and Pandolfino 2013). **February – Sept.**	Documented occurrence near Independence Lake and Yuba Pass (CNDDB 2018); no occurrences in or near the proposed BSA, but potentially suitable foraging and nesting habitat is present in and around English Meadows.	Low potential direct, indirect, or cumulative impacts to nesting or foraging habitat since the species is not known to occur in the BSA	Prior to any grading or tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the Great Gray Owl nesting season (February 1 - September 1). If an active raptor nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.

Grus canadensis tabida **Greater Sandhill Crane** **CT**	Summers and breeds in open terrain near shallow lakes or freshwater marshes; winters in plains and valleys in flooded rice fields or near bodies of fresh water. **April - August**	Extant, a pair was observed repeatedly at English Meadow in 2017 and 2018, but no direct evidence of nesting there since no juveniles were observed (Mink, Stevens, and Williams pers. comms.). Documented breeding at Lacey Valley and in Sierra Valley (CNDDB 2018).	Moderate potential direct, indirect, or cumulative impacts to nesting or foraging habitat since the species is known to occur in the BSA	Prior to any grading or tree removal activities, a focused survey for Sandhill Crane nests shall be conducted by a qualified biologist during their nesting season (February 1 - September 1). If an active nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.
Falco peregrinus anatum **American Peregrine Falcon** **FS/CE/FP**	Permanent residents in the Sierra Nevada where females lay their eggs in "eyries," or nesting sites, usually simple recesses on tall, inaccessible cliffs that offer expansive views of the surrounding landscape; non-breeding Peregrines might be seen anywhere high cliffs provide good views of productive foraging areas (Beedy and Pandolfino 2013). **March - August**	An adult was seen and photographed at Jackson Meadow Reservoir in July 2018, but breeding status was not confirmed (Beedy pers. obs.). No confirmed nesting records in or near the BSA (CNDDB 2018).	Low potential for direct, indirect, and cumulative impacts since the species is not known to occur in the BSA	No measures required since there are no suitable cliff nesting sites in or near the BSA.
Picoides arcticus **Black-backed Woodpecker** **--/SR2**	Permanent residents of higher elevations of the Sierra Nevada where they frequent dead and dying and recently-burned trees with ample supplies of wood-boring beetles (Beedy and Pandolfino 2013) **March-August**	Potentially suitable breeding and foraging habitat in lodgepole pine and red fir forests surrounding English Meadows, but none observed during field surveys; documented occurrences near Yuba Pass and Sierraville (CNDDB 2018).	Low potential for direct, indirect, and cumulative impacts since the species is not known to occur in the BSA	Prior to any grading or tree removal activities, a focused survey for Black-backed Woodpecker nests shall be conducted by a qualified biologist during their nesting season (March 1 - August1). If an active nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.

Cypseloides niger **Black Swift** **--/CSC**	Widespread in California during migration but highly localized in the western Sierra Nevada where the population may be less than 50 pairs; known breeding localities include Yosemite Valley and in the Royal Gorge of the North Fork American River (Beedy pers. obs.) where they nest in small colonies on cliffs behind or adjacent to waterfalls in deep river canyons (Beedy and Pandolfino 2013). **May – September.**	Rare, localized distribution and no documented records in or near the BSA (CNDDB 2017)	No impact to nesting or foraging habitat	No measures required.
Chaetura vauxi **Vaux's Swift** **--/CSC**	Nests rarely in mid-elevation forests of Sierra Nevada, usually from about 3,000 to 7,000 feet in large, hollow snags (Beedy and Pandolfino 2013) **May – September**	Potentially suitable nesting and foraging habitat in forests surrounding English Meadows in the BSA; suitable foraging habitat present throughout the meadow and forest systems.	Potential impact to nesting or foraging habitat	All proposed timber harvesting activities in potential habitat areas will occur after the nesting season and no large snags that could provide potential nesting habitat will be removed
Empidonax traillii **Willow Flycatcher** **FS/CE/CDF**	Typically found in riparian areas often dominated by willow and/or alder, and permanent water in the form of low gradient watercourse, ponds, lakes and wet meadows (Matthewson et al. 2013). **May - August**	No suitable nesting habitat currently exists in the BSA since the English Meadow system is too dry. Protocol surveys using the methods of Bombay et al. (2000) had no detections there. Suitable habitat may be present for foraging and migrants. Extant breeding populations at Lacy Valley, Weber Lake, and Perazzo Meadow, and Milton Reservoir (CNDDB 2018).	Low potential direct, indirect, or cumulative impacts to nesting or foraging habitat since the species is not known to occur in the BSA, however, proposed meadow restoration measures could create suitable habitat	Prior to any grading or tree removal activities, a focused survey for Willow Flycatcher nests shall be conducted y a qualified biologist during the Willow Flycatcher nesting season (May 15 – August 1). If an active nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.
Dendroca petechia brewsteri **California Yellow warbler** **CSC**	In the Sierra Nevada, nests and forages in riparian habitats dominated by willows, cottonwoods, sycamores, or alders near stream courses and in mature mountain chaparral (Beedy and Pandolfino 2013). **May - August**	Extant, fairly common breeders in riparian habitats at English Meadows (Beedy pers. obs.).	Potential direct impacts to nesting or foraging habitat	Prior to any grading or tree removal activities, a focused survey for raptor nests shall be conducted by a qualified biologist during the Yellow Warbler nesting season (May1 - August 1). If an active nest is identified, appropriate mitigation measures shall be developed and implemented in consultation with CDFW.

Analysis of Special-Status Mammal species that may occur within the Biological Study Area				
Scientific name Common name Status Federal/State	**Habitat (*Critical Period)***	**Analysis – Project Area**	**Potential Direct, indirect and Cumulative Impacts**	**Recommendations**
Pekania pennati pacifica **Pacific Fisher** **FPE/FS/BLM/CSC**	Breeding, resting, and foraging habitat usually consists of old-growth or late successional coniferous forests with greater than 50% canopy closure (Zeiner et al. 1990b). Uses cavities in trees, snags and logs **March – July 31**	Extant, an individual was observed on a trail to English Meadows on August 31, 2018 (Stevens pers. comm..).; other documented occurrences near Webber Lake and Jackson Creek (CNDDB 2018)	Potential direct impact to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile of any documented occurrence
Martes americana sierrae **Sierra Marten** **FS/CSC**	Inhabits late successional forest communities throughout North America. Optimal habitats include various mixed conifer forests with more than 40% canopy. **March – August**	Extant, an individual was observed at the edge of English Meadows during a July 13, 2018 field survey (Beedy pers. obs.); other documented occurrences near the BSA include: Grouse Ridge, Five Lakes Basin, Jackson Meadows Reservoir, Lower Sardine Lake, Dead Horse Canyon, Butcher Ranch Meadow, near Bassetts (CNDDB 2018)	Potential impact to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile of any documented den site
Gulo gulo luteus **California Wolverine** **FS/CT/CFP**	Inhabits a variety of habitat types within an elevation range of 1,600 feet and 14,200 feet. Prefers areas of low human disturbance. Uses caves, hollows in cliffs, logs, and burrow for cover, generally in denser forest stages. Breeding: **May-July** Birth: **January - April**	Possible occurrence near Jackson Meadow Reservoir and at Sagehen Creek (CNDDB 2018)	Potential impact to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile
Vulpes vulpes necator **Sierra Nevada Red Fox** **FS/CT**	Preferred habitat appears to be red fir and lodgepole pine forests in the subalpine zone and alpine fell-fields of the Sierra Nevada between 4,000 and 12,000 feet. Hunts in forest openings and meadows, and barren rocky areas. **February - July**	Project located within the historic range and possible occurrence near Church Meadow (CNDDB 2018); suitable habitat may be present in the BSA.	Potential impact to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile

Canis lupus **Gray Wolf**	The historical abundance and distribution of gray wolves in California is poorly understood and reliable records are rare, wolves are considered to have occurred in the Sierra Nevada, southern Cascades, Modoc Plateau, and Klamath Mountains.	CDFW reported that a two-year-old female, referred to as OR-54, that was collared with a GPS transmitter was located a mile and a half from Interstate 80 near Boreal Mountain (Sierra Sun, June 11, 2018), this was the first documented occurrence of a wolf in the Sierra Nevada in more than 100 years. Officials believe that she is an offspring of OR-7, a wolf that is a native of Oregon but made history in December 2011 for being the first gray wolf to cross into California in decades.	No impact since there are no documented records in or near the BSA	No measures required
Taxidea taxus **American Badger** **CSC**	Suitable habitats include herbaceous and shrub communities and open stages of most other habitats with dry, friable soils where dens are excavated; home ranges can be up to 243 hectares. Breeding: **Aug - October** Birth: **March - April**	Suitable habitat may be present for denning and foraging.	Potential direct impacts to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile
Aplodontia rufa californica **Sierra Nevada Mountain Beaver** **CSC**	Moist montane riparian thickets; burrows within and under dense understory vegetation; does not build dams. **January - July**	Project located within the historic range and documented occurrences near Perazzo Meadow, Poorman Creek near Bowman Lake and near the confluence of Walker Creek and Deer Creek near and Haypress Creek near Sierra City, and near Upper Salmon Lake (CNDDB 2018)	Potential direct impacts to denning or foraging habitat	Report any sightings to Cal Fire & CDFW; Leave den sites and habitat components undisturbed, stop operations within 0.25 mile
Lepus americanus tahoensis **Sierra Nevada Snowshoe Hare** **CSC**	Found in dense thickets of conifers, riparian vegetation, or chaparral in boreal life zones. **Dec - Aug**	Project located within the historic range and records near Yuba Pass (CNDDB 2018); suitable habitat may be present in the BSA.	No impact to suitable habitat	No measures required.
Ochotona princeps **American Pika** **FGC**	Found only at high elevations, inhabits rocky mountain slopes, broken rock and talus fields fringed by alpine meadows. **April - July**	Project located within the historic range and documented near Deadman's Lake (CNDDB 2018); no suitable habitat exists in or near the BSA.	No impact to suitable habitat.	No measures required.

Lasiurus blossevillii **Western Red Bat** **FS/CSC**	Habitat includes forests and woodlands from sea level up through mixed conifer forests. Roosts in trees, found in wooded, riparian, and edge habitats adjacent to streams, fields, or urban areas. **April - August**	No suitable habitat, usually found at lower elevations associated with agriculture lands.	Not applicable	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (July), when young bats are able to fly.
Corynorhinus townsendii pallescens **Pale Townsend's Big-eared Bat** **FGC/FS/BLM/CSC**	Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. It may use separate sites for night, day, hibernation, or maternity roosts. Hibernation sites are cold, but not below freezing. Hibernation occurs from October to April when they may be solitary or in small clusters in their cool roosts. Roosting sites are the most important limiting resource. **April - August**	Project located within the historic range and documented near the Sierra City post office (CNDDB 2017)	Potential impact to suitable habitat	If the pale Townsend's big-eared bat is sighted in the project area during timber operations, all vegetation disrupting activities shall be suspended within ¼ mile of potential roost structures. CDFW and Cal Fire will be immediately consulted. If an occupied roosting site is discovered, all operations (per PRC Section 4527) will be suspended within a 500' radius buffer around the roost site until site specific avoidance measures can be developed and amended into the THP through a minor amendment. All large trees (i.e., >24" dbh) will be avoided, especially large incense cedar trees with historical fire scars that could provide potential roosting habitat (Fellers and Pierson 2002)
Myotis *yumanensis* **Yuma Myotis** **BLM**	Suitable roosting sites are restricted to caves and cave-like structures such as tunnels, mines, and bridges. Found in open forests and woodlands and is almost always associated with water. **May - July**	Suitable habitat may be present off site.	No impact to suitable habitat.	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (July), when young bats are able to fly.
Myotis evotis **Long-eared Myotis** **BLM**	Found in brush, woodland and forests habitats up to 9,000 feet , possibly preferring coniferous woodlands and forests, found using rock outcroppings, crevices, mines, caves, loose bark on trees and snags **May - July**	Suitable habitat may be present	Potential Impacts mitigated to negligible	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (July), when young bats are able to fly.

Euderma maculatum **Spotted Bat** **BLM/CSC**	Found in brush, woodland and forests habitats. Horizontal rock crevices provide the optimal roost sites (Watkins 1977) although they may occasionally use caves and buildings as well. **May - July**	Suitable habitat may be present	Potential Impacts mitigated to negligible	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (July), when young bats are able to fly.
Eumops perotis californicus **California Mastiff Bat** **BLM/CSC**	Roost in crevices in vertical cliffs, usually granite or consolidated sandstone. Inhabits lower sonoran life zone. **March - August**	Suitable habitat may be present	Not applicable	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (Aug), when young bats are able to fly.
Myotis thysanodes **Fringed Myotis** **BLM/CSC**	Found in brush, woodland and forests habitats. Suitable roosting sites are restricted to caves and cave-like structures such as tunnels, mines, and bridges. **April - August**	Suitable habitat may be present	Potential Impacts mitigated to negligible	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (Aug), when young bats are able to fly.
Myotis ciliolabrum **Small-footed Myotis** **BLM**	Found in arid wooded and brushy uplands near water. Suitable roosting sites are caves, buildings, mines, crevices, and occasionally under bridges and under bark. May -June	Suitable habitat may be present off site.	Potential Impacts mitigated to negligible	If a maternity bat roost is discovered in a tree marked for harvest, the marked roost tree shall remain until after the critical period (July), when young bats are able to fly.

Analysis of Special-Status Aquatic species that may occur within the Biological Study Area				
Scientific name Common name Status Federal/State	**Habitat (*Critical Period)***	**Analysis – Project Area**	**Potential Direct, indirect and Cumulative Impacts**	**Recommendations**
Ambystoma macrodactylum sigillatum **Southern Long-toed Salamander** **CSC**	High elevation lakes and meadows in the Sierra Nevada; aquatic larvae occur in ponds and lakes; outside the breeding season adults are terrestrial and associate with underground mammal burrows and moist areas under logs and rocks **April - September**	Documented occurrence near the project areas at Nelson Creek, near Stafford Mountain, near Mt. Elwell, Wades and Jamison Lakes, Lakes Basin, Gold Lake, Goose Lake, Hawley Lake, Church Meadows (CNDDB 2018);aestivation (underground) habitat for southern long toed salamanders is potentially available in forested areas, but it was unclear whether ground-dwelling rodent populations were sufficiently large and diverse to provide large burrow complexes needed by these salamanders when they retreat underground after breeding. Searches under surface litter yielded no salamanders, although the substrata under most of the litter was too dry to provide adequate refuges for these salamanders (Barry pers. comm.)	No impact to suitable habitat as all wetlands and riparian zones will be avoided by equipment.	If Southern Long-toed Salamanders are observed, a buffer shall be established where all vegetation and ground disturbing activities within 10 feet of the observation and adjacent suitable stream/pond/lake habitat shall cease until the RPF consults with Cal Fire and CDFW for appropriate protection measures.
Hydromantes platycephalus **Mount Lyell Salamander** **CDFW Watch List**	Massive rock outcrops within forested areas; only active on the surface when water is present in the form of seeps, springs, or drips; occasionally found under logs and other woody debris **April - September**	Documented occurrences on the northeast and western faces of the Sierra Buttes; but no documented occurrences in or near the BSA (CNDDB 2018)	No impact to suitable habitat as all wetlands and rocky areas will be avoided by equipment.	If Mount Lyell Salamanders are observed, a buffer shall be established where all vegetation and ground disturbing activities within 10 feet of the observation and adjacent suitable stream/pond/lake habitat shall cease until the RPF consults with Cal Fire and the Department of Fish and Wildlife for appropriate protection measures.
Rana sierrae **Sierra Nevada yellow-legged frog** **FE/CE**	Rocky streams and rivers with rocky substrate and open, sunny banks. Isolated pools, vegetated backwater, and deep, shaded,	Documented occurrences near the project area at Poorman Creek, north of Sierra City, Goose Lake, Five Lakes Basin, Tollhouse Lake, French Lake, and Lower Sardine Lake (CNDDB 2018);	No impact to suitable habitat as all wetlands and riparian zones will be avoided by equipment.	If the Sierra Nevada Yellow-Legged Frogs are observed, a buffer shall be established where all vegetation and ground disturbing activities within 10 feet of the observation and adjacent suitable stream/pond/lake

	spring-fed pools. **April - September**	focused surveys in the BSA concluded that the occurrence of this species is unlikely due to the seasonal flows of the Middle Yuba River and the lack of invertebrate prey (Barry pers. comm.).		habitat shall cease until the RPF consults with Cal Fire and CDFW for appropriate protection measures.
Rana draytonii **California Red-legged Frog** **FT**	In the Sierra Nevada, breed along the margins and shallow parts of sunlit pools. These pools may be natural or manmade ponds, wide slow sections of streams, or even small, spring-fed puddles, typically without centrarchid fish (Barry and Fellers 2013).	No suitable habitat within the project site and no documented records in or near the project area (CNDDB 2018)	Not applicable	No measures required.
Oncorhychus clarki henshawi **Lahontan Cutthroat Trout** **FT**	Historically found in all cold waters of the Lahontan Basin. Cannot tolerate presence of other salmonids; there have been no documented sighting of this species within the BSA but it is known to occur in the Middle Yuba River up East Fork to Austin Meadows (CNDDB 2018).	No suitable habitat within the project site.	Not applicable	No measures required.
Oncorhynchus mykiss **Central Valley steelhead** **FT**	Populations in the Sacramento and San Joaquin Rivers and their tributaries.	No suitable habitat within the project site.	Not applicable	No measures required.
Hypomesus transpacificus **Delta smelt** **FT/CT**	Sacramento-San Joaquin Delta. Seasonally in Suisun Bay, Carquinez Strait and San Pablo Bay. Micro: seldom found in salinities > 10PPT. Most often at salinities < 2PPT.	No suitable habitat within the project site.	Not applicable	No measures required.

Analysis of Special-Status Plant species that may occur within the Biological Assessment Area				
Scientific name Common name **Fed./ State/ CRPR**	**Habitat (*Identification Period)***	**Analysis/ Possibility of Occurrence**	**Potential Impacts**	**Recommendation**
Moonwort species *Botrychium crenulatum* **Scalloped moonwort** G4/S3; 2B.2[1]; USFS Sensitive *B. minganense* **Mingan moonwort** G4G5/S3; 2B.2; USFS Sensitive *B. montanum* **Western goblin** G3/S2; 2B.1; USFS Sensitive Family: Ophioglossaceae	Suitable habitats are ecotonal edges of wetlands such as wet meadows, springs, seeps, fens, and riparian areas in montane coniferous forest. We found leather grape fern (*Sceptridium multifidum*) in similar habitats to *Botrychium*, growing in duff at the ecotonal edge of wetlands. **Elevation:** 1500–3600 m. **Flowering time:** (June) July–Sept (Oct)	Suitable habitat / possible	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** This habitat is unlikely to occur in restoration project footprint.	Recommend plant surveys during appropriate blooming period in 2019.
Carex davyi (constanceana) **Davy's sedge** G3/S2; 1B.3 Family: Cyperaceae	Edges of meadows in lodgepole pine. Dry often sparse meadows, slopes; **Elevation:** 1400–3300 m. **Fruiting Time**: June–Sept.	Suitable habitat / likely	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	Each year, prior to the limited operating period and during the flowering period, the project area targeted for treatment will be surveyed by a Botanist. Occurrences will be flagged for avoidance. Recommend plant surveys during appropriate blooming period in 2019.
Carex lasiocarpa **Woolly fruited sedge** G5/S2; 2B.3 Family: Cyperaceae	Wetland habitat including wet meadows, fens, lake or river margin edges. Plants growing with C*. lasiocarpa* include the following: *Salix lemmonii*, *Salix scouleriana*, *Galium triflorum*, *Deschampsia cespitosa Agrostis stolonifera*, *Poa pratensis*, *Juncus colvillei, Juncus nevadensis*, *Carex heteroneura*, *Carex simulata*, *Carex raynoldsii, Spiranthes romanzoffiana, Potentilla gracilis*, *Perideridia parishii*, **Elevation:** 600–2100 m **Fruiting Time:** July–Aug	**Species and suitable habitat is present**. Plant found growing in elevated micro-topography areas in fens and wet meadows	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP.** This plant is within the restoration project footprint.	Each year, prior to the limited operating period, and during the flowering period, the project area targeted for treatment will be surveyed by a Botanist. Occurrences will be flagged for avoidance. Recommend plant surveys during appropriate blooming period in 2019.
Corallorhiza trifida **Northern coral root** G5/S1; 2B.1 Family: Orchidaceae	Mesic swales, seasonal wetlands, open to shaded, generally conifer forest; **Elevation:** 1400--1700 m. **Flowering Time:** July	Suitable habitat may be present/ possible	**THP** This plant has not been detected on site. Suitable habitat may be present. **RP:** No impact to suitable habitat as this plant not likely to occur within the restoration footprint.	Recommend plant surveys during appropriate blooming period in 2019.

Analysis of Special-Status Plant species that may occur within the Biological Assessment Area				
Scientific name Common name **Fed./ State/ CRPR**	**Habitat (*Identification Period)***	**Analysis/ Possibility of Occurrence**	**Potential Impacts**	**Recommendation**
Epilobium howellii **subalpine fireweed** G4/S4; 4.3 (limited distribution) Family: Onagraceae	Mesic areas such as wet meadows, mossy seeps and subalpine coniferous forest. **Elevation:** 1950–2700 m. **Flowering Time:** Jul–Aug.	Suitable habitat may be present/ likely	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	No measures required. Recommend plant surveys during appropriate blooming period in 2019.
Erigeron miser **Starved daisy** G3/S3; 1B.3 Family: Asteraceae (Compositae)	Granite outcrops. Plants growing with *E. miser* include the following: *Penstemon newberryi*, *P. deustus*, *Phlox hoodii*, *Eriogonum umbellatum* ssp. *nevadensi*s, *Silene lemmonii*, *Poa secunda*, *Stipa californica*, *Carex rossii*, *Cryptogramma cascadensis*, *Pellaea bridgesii, Cheilanthes* (*Myriopteris*) *gracillima*. **Elevation:** 1900–2300 m**. Flowering Time:** Jul–Oct.	**Suitable habitat is present.** Plant found growing on rocky outcrops in project area	**THP** Tractor/Skidder/ mastication work, slash pile and burning if equipment/work is next to the granite outcrops –likely **RP:** No impact to suitable habitat as this plant not likely to occur within the restoration footprint.	Each year, prior to the limited operating period, the project area targeted for treatment will be surveyed by a Botanist. Starved daisy does not occur in restoration project area. Slash piles for burning should be placed at least 100 feet from known occurrences.
Eriogonum umbellatum var. torreyanum **Donner Pass Buckwheat** G5T2/S2; 1B.2; USFS Sensitive Family: Polygonaceae	In gravelly or sandy sites, often on harsh exposures such as ridge tops or steep slopes. Sometimes within depressions or near seeps in volcanic or granitic soils. **Elevation:** (1800) 2100–2400 m. **Flowering Time:** Jul–Sept.	Suitable habitat may be present / not likely	**THP** Tractor/Skidder/ mastication work, slash pile and burning will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	Recommend plant surveys during appropriate blooming period in 2019.
Ivesia sericoleuca **Plumas ivesia** G2/S2; 1B.2; USFS Sensitive Family: Rosaceae	Dry, generally volcanic meadows. Some areas with an underlying clay pan and slow drainage in the spring. In Truckee populations grow with *Deschampsia cespitosa*, *Achillea millefolium*, *Poa pratensis*, *Poa secunda*, *Dodecatheon* sp., *Lupinus polyphyllus.* **Elevation:** 1300–2320 m. **Flowering Time:** May–Sep	Suitable habitat may be present/ possible in dry meadows that are outside riparian zones	**RP** Removal and covering up individuals by equipment restoring dry meadows and using soil for fill if mitigations listed below are not followed.	Recommend plant surveys during appropriate blooming period in 2019.
Oreostemma elatum **Plumas alpine aster** G2/S2; 1B.2 Family: Asteraceae (Compositae)	Peatlands, fens, marshy areas, wet meadows, montane forests. **Elevation**: 1000–1500 m. **Flowering Time:** Jul–Aug.	Suitable habitat may be present/ possible	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	Recommend plant surveys during appropriate blooming period in 2019.

Analysis of Special-Status Plant species that may occur within the Biological Assessment Area				
Scientific name Common name **Fed./ State/ CRPR**	**Habitat (*Identification Period)***	**Analysis/ Possibility of Occurrence**	**Potential Impacts**	**Recommendation**
Packera indecora **Rayless mountain ragwort** G5/S2?; 2B.2 Family: Asteraceae (Compositae)	Damp areas along streams, meadows, woodland. **Elevation:** < 2300 m. **Flowering Time:** Jun–Aug.	Suitable habitat may be present/ possible	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	Recommend plant surveys during appropriate blooming period in 2019.
Potamogeton praelongus **White-stemmed pondweed** G5/S2; 2B.3 Family: Potamogetonaceae	Deep water, lakes. **Elevation:** 1800–3000 m. **Flowering Time:** July–Aug**.**	Suitable habitat may be present/ possible	No impacts to suitable habitat as ponded habitats are outside the proposed project areas.	Recommend plant surveys during appropriate blooming period in 2019.
Pseudostellaria sierrae **Sierra starwort** G3G4/S3; 4.2 Family: Caryophyllaceae	Forest edges and openings, mixed conifer, somewhat shaded, duff and litter. **Elevation:** 1200–2200 m. **Flowering Time:** May–Aug.	Suitable habitat may be present/ likely	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** This habitat is unlikely in restoration project footprint.	Recommend plant surveys during appropriate blooming period in 2019.
Pyrrocoma lucida (Haplopappus lucidus) **Sticky pyrrocoma** G3/S3; 1B.2; USFS Sensitive Family: Asteraceae (Compositae)	Alkaline clay flats, sagebrush scrub, open yellow pine forest. **Elevation:** 700–2500 m. **Flowering Time:** Jul–Sept.	Suitable habitat may be present/ possible	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** This habitat is unlikely in restoration project footprint.	Recommend plant surveys during appropriate blooming period in 2019.
Stellaria obtusa **Obtuse starwort** G5/S4; 4.3 Family: Caryophyllaceae	Wetlands and non-wetlands , forest edges and openings of red fir forests **Elevation:** 1600–2000 m **Flowering time:** May–Sept.	Suitable habitat may be present/ possible	**THP** No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP** If found on site, this plant is likely within the restoration footprint	Recommend plant surveys during appropriate blooming period in 2019.
Community type: Fen All elevations within the Tahoe National Forest under the Sierra Nevada Forest Plan Amendment (2004)	Slope wetlands (Fens)	Fens are found on sites of groundwater discharge and springs. Some fens on site are in outstanding condition (Stevens 2017)	**THP**: No impact to suitable habitat as all riparian zones will be avoided by equipment. **RP**: Fens on site are mostly peripheral to the Restoration Project Footprint. Restoration on site will increase fen functions and values in a landscape setting.	Recommend avoiding fens when possible.

GLOBAL RANKING

The *global rank* is a reflection of the overall status of an element throughout its global range. **Both Global and State ranks represent a letter + number score that reflects a combination of Rarity, Threat and Trend factors, with weighting being heavier on Rarity than the other two.**

SPECIES OR NATURAL COMMUNITY LEVEL

G1 = **Critically Imperiled**—At very high risk of extinction due to extreme rarity (often 5 or fewer populations), very steep declines, or other factors.

G2 = **Imperiled**—At high risk of extinction due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors.

G3 = **Vulnerable**—At moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors.

G4 = **Apparently Secure**—Uncommon but not rare; some cause for long-term concern due to declines or other factors.

G5 = **Secure**—Common; widespread and abundant.

SUBSPECIES LEVEL

Subspecies receive a **T-rank** attached to the G-rank. With the subspecies, the G-rank reflects the condition of the entire species, whereas the T-rank reflects the global situation of just the subspecies or variety. For example: *Chorizanthe robusta* var. *hartwegii* is ranked G2T1. The G-rank refers to the whole species range i.e., *Chorizanthe robusta.* The T-rank refers only to the global condition of var. *hartwegii*.

STATE RANKING

The *state rank* (S-rank) is assigned much the same way as the global rank, but state ranks refer to the imperilment status only within California's state boundaries.

S1 = **Critically Imperiled**—Critically imperiled in the state because of extreme rarity (often 5 or fewer populations) or because of factor(s) such as very steep declines making it especially vulnerable to extirpation from the state.

S2 = **Imperiled**—Imperiled in the state because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the state.

S3 = **Vulnerable**—Vulnerable in the state due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation from the state.

S4 = **Apparently Secure**—Uncommon but not rare in the state; some cause for long-term concern due to declines or other factors.

S5 = **Secure**—Common, widespread, and abundant in the state.

Notes:

1. Other considerations used when ranking a species or natural community include the pattern of distribution of the element on the landscape, fragmentation of the population/stands, and historical extent as compared to its modern range. It is important to take a **bird's eye or aerial view** when ranking sensitive elements rather than simply counting element occurrences.

2. Uncertainty about the rank of an element is expressed in two major ways:

By expressing the ranks as a **range** of values: e.g., S2S3 means the rank is somewhere between S2 and S3.

By adding a ? to the rank: e.g., S2? This represents more certainty than S2S3, but less certainty than S2.

3. Other symbols:

GH All sites are **historical**; the element has not been seen for at least 20 years, but suitable habitat still exists (SH = All California sites are historical).

GX All sites are **extirpated**; this element is extinct in the wild (SX = All California sites are extirpated).

GXC Extinct in the wild; exists in cultivation.

G1Q The element is very rare, but there are **taxonomic questions** associated with it.

T Rank applies to a subspecies or variety.

California Rare Plant Ranks

1A. Presumed extirpated in California and either rare or extinct elsewhere

1B. Rare or Endangered in California and elsewhere

2A. Presumed extirpated in California, but more common elsewhere

2B. Rare or Endangered in California, but more common elsewhere

3. Plants for which we need more information - Review list

4. Plants of limited distribution - Watch list

Other – Status

CDFW_FP-Fully Protected

CDFW_SSC-Species of Special Concern

CDFW_WL-Watch List

BLM_S-Sensitive,

USFS_S-Sensitive

IUCN_NT-Near Threatened,

IUCN_EN-Endangered,

IUCN_VU-Vulnerable

IUCN_LC-Least Concern

USFWS_BCC-Birds of Conservation Concern

Appendix 4 – CAL FIRE List of Harvest Permits

http://bofdata.fire.ca.gov/hot_topics_resources/dead_tree_removal_and_fuel_reduction_permit_chart.pdf

- CalTREES 0-150 Fire Safe Exemption Form
- CalTREES 150-300 Fire Safe Exemption Form
- CalTREES Drought Mortality Exemption Form
- CalTREES Emergency Notice RM-67 Form
- CalTREES FHR Emergency Notice RM-65 Form
- CalTREES Forest Fire Prevention Exemption Form
- CalTREES Forest Fire Prevention Pilot Project Exemption Form
- CalTREES less than 3 acre Conversion Exemption Form
- CalTREES Oak Woodland Restoration Exemption Form
- CalTREES Post Fire Recovery Exemption Form
- CalTREES SOD Emergency Notice RM-66 Form
- CalTREES Unmerchantable Sawlog Substantially Damaged Exemption Form
- CalTREES Utility ROW Exemption Form
- CalTREES Woody Debris Slash Removal Exemption Form
- Post Fire Recovery (1/31/18)
- Oak Woodland Management (1/26/18)
- Technical Rule Addendum No. 1 - Estimating Surface Soil Erosion Hazard Rating (432K PDF)
- Notice of Preparation Form for Fresno Review Team Office (1/13)
- Notice of Preparation Form for Redding Review Team Office (1/13)
- Notice of Preparation Form for Santa Rosa Review Team Office (1/13)
- Forest Fire Prevention Exemption Checklist (12/08)
- Forest Fire Prevention Exemption Form (12/08)
- Program Timber Harvesting Form (New 2/05)
- RPF Plan Submitter & Timberland Owner Responsibility Form and LTO Responsibility Form
- THP (Rev. 03/15)
- THP Instructions (Rev. 01/00)
- NTMP Form (Rev.08/05)
- NTMP Instructions (New 01/00)
- NTMP - Notice of Timber Operations (12/11)
- Completion/Stocking Report (12/08)
- Notice of Intent Form for Fresno Review Team Office (9/17)
- Notice of Intent Form for Redding Review Team Office (9/17)
- Notice fo Intent Form for Santa Rosa Review Team Office (9/17)
- Fuel Hazard Reduction Emergency Checklist (12/09)
- Fuel Hazard Reduction Emergency Form (1/10)
- Emergency Notice Form RM-67 (1/10)
- Christmas Tree, Dead, Dying, Diseased, Fuelwood or Split Products Exemption (11/11)
- Less Than Three Acre Conversion Exemption (11/12)
- Public Agency, Public and Private Utility Right of Way Exemption (12/08)
- Substantially Damaged Timberland, Unmerchantable as Sawlog Exemption (12/08)
- Wood Debris and Slash Removal Exemption (12/08)
- Sudden Oak Death Emergency Notice (2/1/11)
- Drought Mortality Exemption (7/15)
- Removal of Fire Hazard Trees up to 300 Feet of a Structure Exemption (7/15)

Appendix 5 – Additional Professional Assistance

California Department of Fish and Wildlife Website: (http://www.dfg.ca.gov/).

The Department of Fish and Wildlife provides information and recommendations to private landowners on programs and activities for the protection, management, and enhancement of native wildlife, fish, plants, and habitats. A variety of programs and partnerships between the State and private landowners are available. These initiatives could include timber management in the context of improving wildlife habitat.

California Forest Stewardship Program

Website: (http://www.calfire.ca.gov//foreststeward). The California Forest Stewardship Program is designed to encourage good stewardship of private forestland. The program provides technical and financial assistance to influence positive changes to forestland management, assists communities in solving common watershed problems, and helps landowners.

CAL FIRE Forest Advisor/Forestry Assistance Specialist in Your Area

Website (http://www.calfire.ca.gov/resource_mgt/resource_mgt_forestryassistance) CAL FIRE provides technical advice and assistance to private landowners regarding forest issues such as timber management, fire, and forest pests.

CAL FIRE Pest Management Program

Website: (http://www.calfire.ca.gov/resource_mgt/resource_mgt_pestmanagement). CAL FIRE's forest pest specialists help protect the state's forest resources from native and introduced pests, conduct surveys and provide technical assistance to private forest landowners, and promote forest health on all forest lands.

Sierra County Agricultural Commissioner

Website: (https://www.sierracounty.ca.gov/169/Agriculture). You will find useful information about the functions and activities of the Department of Agriculture, such as crop statistics, biological control programs, pesticide registration and regulation, organic production, current issues, and our consumer protection role as a function of the department's Weights & Measures program. This Department also administers the Fish and Wildlife Commission, Predatory Animal Control and Agriculture Advisory Commission.

Redbud Chapter of the California Native Plant Society

Website: (http://www.redbud-cnps.org/). Their mission is to increase the understanding and appreciation of California's native plants and to conserve them and their natural habitats through education, science, advocacy, horticulture, and land stewardship.

Sierra Valley Resource Conservation District

Website: (http://www.sierravalleyrcd.com) The RCD acts as independent local liaison between the federal government and landowners. Assist local people to initiate and carry out long-range programs of resource conservation and development. Conducts grant searches on accepted measures. Provide multi-county planning coordination. Program objectives focus on "quality of life" improvements achieved through natural resources conservation and community development.

Environmental Quality Incentives Program (EQIP)

Website: (http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/). EQIP offers financial and technical help to assist private timberland owners install or implement structural and management practices on eligible agricultural land. Provides incentives in the form of cost share payments to implement conservation practices including forestry management practices on non-industrial private forestland.

Sierra County Firesafe & Watershed Council

Website: (http://sierracountyfiresafe.org//). The Sierra County Firesafe & Watershed Council provides community assistance, information and educational programs in an effort to reduce the risks of wildfire danger to life and property in our county.

Forest Landowners of California

Website: (http://www.forestlandowners.org/). Their mission is to advance sustainable, science-based management practices to enhance and ensure long-term productivity and beauty of California's private forestlands. Provide access to experienced members and professionals in the fields of forestry, fire protection, product marketing, eco-system management, estate planning, accounting, law, and education. Protect the family forest owner from unreasonable regulations. Promote improved marketing opportunities for forest products and recreational and wildlife benefits of forestland. Provide opportunities for family forest owners to meet and share common goals, challenges, and interests.

U.C. Cooperative Extension Advisor

Website: (http://ceplacer.ucanr.edu/). Their Natural Resource Program provides forestry, wildlife, rangeland, watershed management and other natural resource related information to a wide variety of county residents and visitors. The main clientele for this position are private landowners; resource management professionals working on private, State and Federal lands; and other groups such as users of public lands, conservation organizations, and the agriculture and forest products industries.

Wildlife Habitat Incentives Program (WHIP)

Website: (http://www.nrcs.usda.gov/programs/whip/). The Wildlife Habitat Incentives Program (WHIP) is a voluntary program for people who want to develop and improve wildlife habitat primarily on private land. Through WHIP USDA's Natural Resources Conservation Service provides both technical assistance and up to 75 percent cost-share assistance to establish and improve fish and wildlife habitat. WHIP agreements between NRCS and the participant generally last from 5 to 10 years from the date the agreement is signed.

Williamson Act Program

Website: (http://www.conservation.ca.gov/dlrp/lca/Pages/Index.aspx). The California Land Conservation Act of 1965 -- commonly referred to as the Williamson Act – enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments, which are much lower than normal because they are based upon farming and open space uses as opposed to full market value.

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