Thompson Meadow Restoration & Water Budget Evaluation Project

Environmental Assessment / Initial Study

Thompson Creek, typical incised channel (Photo credit: Plumas National Forest, June 5, 2015)

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for

USDA - Forest Service
and the
State of California
Department of Water Resources

United States Department of Agriculture
Forest Service

State of California
Department of Water Resources

July 2020

General Information about This Document

What's in this document?

The United States Department of Agriculture (USDA), Forest Service (USFS) and the California Department of Water Resources (DWR) have prepared this Environmental Assessment/ Initial Study (EA/IS), which examines the potential environmental impacts of the proposed project located on Plumas National Forest system lands in Plumas County, California. USFS is the lead agency under the National Environmental Policy Act (NEPA) and DWR is the lead agency under the California Environmental Quality Act (CEQA). This document tells you why the project is being proposed, what design options we have considered for this project, how the existing environment could be affected by the project, the potential impacts of the preferred action alternative, and the proposed avoidance, minimization, and/or mitigation measures.

The Thompson Meadow Restoration Project EA/IS and supporting documents are available for public review at the Plumas National Forest, Beckwourth Ranger District, 23 Mohawk Road, Blairsden, CA 96103. Electronic copies are also available online at: http://www.fs.usda.gov/project/?project=52760. It is also possible to navigate to the project website via the Plumas National Forest webpage (https://www.fs.usda.gov/plumas). Select the "Land and Resources Management" tab, then select "Browse through the Forest Projects," and then find the project name. For additional information concerning this document, contact: Matthew Jedra, Beckwourth District Ranger, Plumas National Forest, at 530-836-2575 or matthew.jedra@usda.gov, or Todd Hillaire, Senior Water Resources Engineer, California Department of Water Resources, Northern Region Office, at 530-529-7347 or Todd.Hillaire@water.ca.gov.

USFS and DWR will make the final determinations of the project's effect on the environment, resulting in the possible following outcomes: (1) authorize environmental approval of the proposed project, (2) call for additional environmental studies, or (3) abandon the project. If there is no substantial evidence on the basis of the whole record before it that the project may have a significant effect on the environment, DWR intends to adopt a Mitigated Negative Declaration (MND) and mitigation monitoring or reporting program and prepare a Notice of Determination. Similarly, if USFS determines the proposed action will not result in significant effects on the environment, USFS will issue a Decision Notice (DN) with a Finding of No Significant Impact (FONSI) in accordance with NEPA. The NEPA process allows for a 45-day objection period for eligible individuals or entities (as defined by 36 CFR 218.2) who submitted timely, project specific written comments during a public comment period.

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Common Acronyms

ADI	Area of Direct Impact
APE	Area of Potential Effects
BA	Biological Assessment
BE	Biological Evaluation
BMP(s)	Best Management Practice(s)
CAA	Clean Air Act
CARB	California Air Resources Board
CAAQS	California Ambient Air Quality Standards
CDFA	California Department of Food and Agriculture
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CVLC	Clover Valley Lumber Company
DN	Decision Notice
DWR	California Department of Water Resources
CWE	Cumulative Watershed Effects
EA	Environmental Assessment
EO	Executive Order
ERA	Equivalent Roaded Acres
FESA	Federal Endangered Species Act
FFRA	Federal Fire Protection Responsibility Area
FONSI	Finding of No Significant Impact
GHG	Greenhouse gases
GGERP	Greenhouse Gas Emissions Reduction Plan
IPaC	Information for Planning and Consultation
IS	Initial Study
LOP	Limited Operating Period
LRMP	Land and Resource Management Plan
MBTA	Migratory Bird Treaty Act
MCAB	Mountain Counties Air Basin
MIS	Management Indicator Species
MND	Mitigated Negative Declaration
NAGPRA	Native American Graves Protection and Repatriation Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NFS	National Forest System
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHV	off-highway vehicle
OHWM	Ordinary High Water Mark

PNF	Plumas National Forest
PRC	Public Resources Code
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SHPO	State (California) Historic Preservation Officer
SNFPA	Sierra Nevada Forest Plan Amendment
SSC	Species of Special Concern
SWRCB	State Water Resources Control Board
TES	Threatened and Endangered Species
TEPS	Threatened, Endangered, and Protected Species
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Load
TRL	Timber Resource Land
UFRW	Upper Feather River Watershed
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
VHFHSZ	Very High Fire Hazard Severity Zone
VMS	Visual Management System
VQO	Visual Quality Objective

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Chapter 1. Proposed Project

1.1. Introduction

The United States Department of Agriculture, Forest Service (USFS), in partnership with California Department of Water Resources (DWR), is proposing to restore the natural hydrologic function of 47 acres of degraded meadow along a 0.68 mile reach of Thompson Creek using a variety of restoration techniques including complete fill of the incised channel, in-channel raised riffle rock structures, and partial fill of the incised channel (commonly known as 'pond and plug'). A mid-elevation meadow within the East Branch North Fork Feather River Watershed, at the headwaters of the California State Water Project, Thompson Meadow is surrounded by open eastside pine forest and sagebrush. The meadow is accessible via a typical network of National Forest System (NFS) roads. Livestock grazing is the primary land use, with dispersed recreation (e.g. camping). Surrounding land uses and actions in the vicinity of the meadow include timber harvest, fuels reduction, and dispersed summer and winter recreational activities.

This Environmental Assessment/ Initial Study (EA/IS) was prepared to determine whether implementation of activities to restore the natural hydrological function, including the historical meadow water table elevation, of the Thompson Meadow system may significantly affect the quality of the environment and thereby require the preparation of an environmental impact statement and environmental impact report. This EA/IS was prepared in compliance with the National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500-1508), and California Environmental Quality Act (CEQA) and the State CEQA Guidelines (California Code of Regulations, Title 14, Chapter 3, Sections 15000-15387), respectively. The term "proposed project", as used herein, is the same as the term "Proposed Action" used under NEPA. For more details of the proposed project, see the Proposed Project section of this document.

1.2. Background

Plumas National Forest (PNF) and DWR have been working collaboratively for several years to develop a restoration and water budget evaluation project in Thompson Meadow. The primary goals of the proposed project are restoration of historic floodplain function and restoration of the historic meadow water table elevation. Flood flows are currently confined to an incised channel. Restoration of the channel is expected to spread flood flows outside of the channel, thereby reducing flow stresses on the banks and reducing stream bank erosion. The existing incised channel acts as a drain for meadow moisture, so channel restoration is also expected to enhance groundwater retention in the meadow. Restoration of the water table elevation is expected to reestablish meadow vegetation communities by allowing plant roots to reach the water table throughout much of the growing season. Restored meadow vegetation is expected to improve the quality of wildlife habitat and grazing forage. Anticipated improvements to water quality, including reduced water temperatures and decreased sediment supply, are expected to benefit aquatic species.

DWR is conducting a surface water and groundwater monitoring program of the proposed project area to improve the understanding and quantification of hydrologic benefits of meadow restoration in the Sierra Nevada. DWR has installed monitoring equipment to thoroughly evaluate changes in stream flow entering and leaving the meadow before and after restoration. This monitoring network includes stream flow gages, groundwater measurement wells, soil moisture sensors, a weather station, and two evapotranspiration measurement stations. Pre-project hydrologic and climate data have been collected continuously since 2012. Post-project hydrologic monitoring is planned to continue for 5 years following project implementation, with DWR then modeling the project effects. No additional installation of monitoring equipment is proposed. Project monitoring would also include pre- and post-implementation surveys of avian, terrestrial, and aquatic wildlife, as well as vegetation mapping.

DWR is funding and operating the hydrologic monitoring network and has conducted pre-project wildlife and vegetation surveys. PNF has provided environmental monitoring support with supplemental monitoring of wildlife, surface water temperature and dissolved oxygen, and vegetation surveys. Construction design for the proposed project was performed by a team of DWR and USFS engineers. Final approval of engineering plans and specifications prior to construction would be performed by USFS engineers. Conceptual design elements were reviewed by signatories of the Upper Feather River Watershed Roundtable. Prop 1 grant funds from California Department of Fish and Wildlife (CDFW) were secured to assist with the environmental analysis compliance documentation (e.g. NEPA and CEQA) for the proposed project. No implementation funding has been secured to date.

1.3. Management Direction

The Pacific Southwest Region of the USFS has made a commitment to focus on management efforts that promote ecological restoration. The Regional Leadership Intent for Ecological Restoration set a goal to restore "at least 50% of accessible, degraded forest meadows to improve their habitat function and ability to hold water longer into the summer and deliver clean water when most needed" (USDA 2011). The proposed project alternatives are consistent with the Regional Forester's 2011 intent to increase the pace and scale of ecological restoration within the USFS Pacific Southwest Region.

The proposed project is part of a broader resource management program under the authority of the 1988 Plumas National Forest Land and Resource Management Plan (1988 PNF LRMP) (USDA 1988), as amended by the 2004 Sierra Nevada Forest Plan Amendment (2004 SNFPA) Record of Decision (ROD) (USDA 2004). This proposed project is consistent with the 1988 PNF LRMP management direction for range, riparian, and water resources in the Dotta Management Area 36 (p. 4-328 – 4-333). General direction in this Management Area includes expanding range productivity and improving water quality. Standards and guidelines for water in the Dotta Management Area include stabilizing stream channels in the Red Clover Creek watershed. In addition, this proposed project meets the 1988 PNF LRMP objectives of maintaining or improving water quality to protect beneficial uses and reducing sediment yields from watersheds in deteriorating condition (p. 4-7).

This proposed project is also consistent with the Aquatic Management Strategy goals of the 2004 SNFPA ROD, including restoration of stream banks, water quality, plant and animal community viability and diversity, habitat connectivity, and floodplain and water table connectivity (p. 32-34). This proposed project meets the desired conditions of the riparian conservation areas such that streams and their riparian areas would be restored to their proper functioning condition.

Mountain meadows have been specifically identified in the California Water Action Plan for protection and restoration, as well as managing headwaters for multiple benefits (CA Natural Resources Agency 2014). Recognizing that water is one of the most pivotal resources affected by climate change in California, federal and State agencies and funding programs support projects that engage partnerships, develop closer coordination amongst resource management organizations, and provide a broad range of ecosystem benefits. Goal 15 of DWR's Strategic Plan (updated October 2019) is to restore critical ecosystem function to California's watersheds through multi-benefit habitat and flood-risk reduction projects, including assisting with restoration efforts of upper watersheds, meadows, riverine systems, and other areas important for biodiversity and water supply.

1.4. Proposed Project Location

Thompson Creek is a tributary to McReynolds Creek, which flows to Red Clover Creek in northeastern Plumas County. The project area is located solely on National Forest System lands within the Beckwourth Ranger District of the Plumas National Forest, approximately 11 air miles north of Portola, CA, in the vicinity of Red Clover Valley, and lies within T25N, R13E, Sections 25 and 36 (Figure 1).

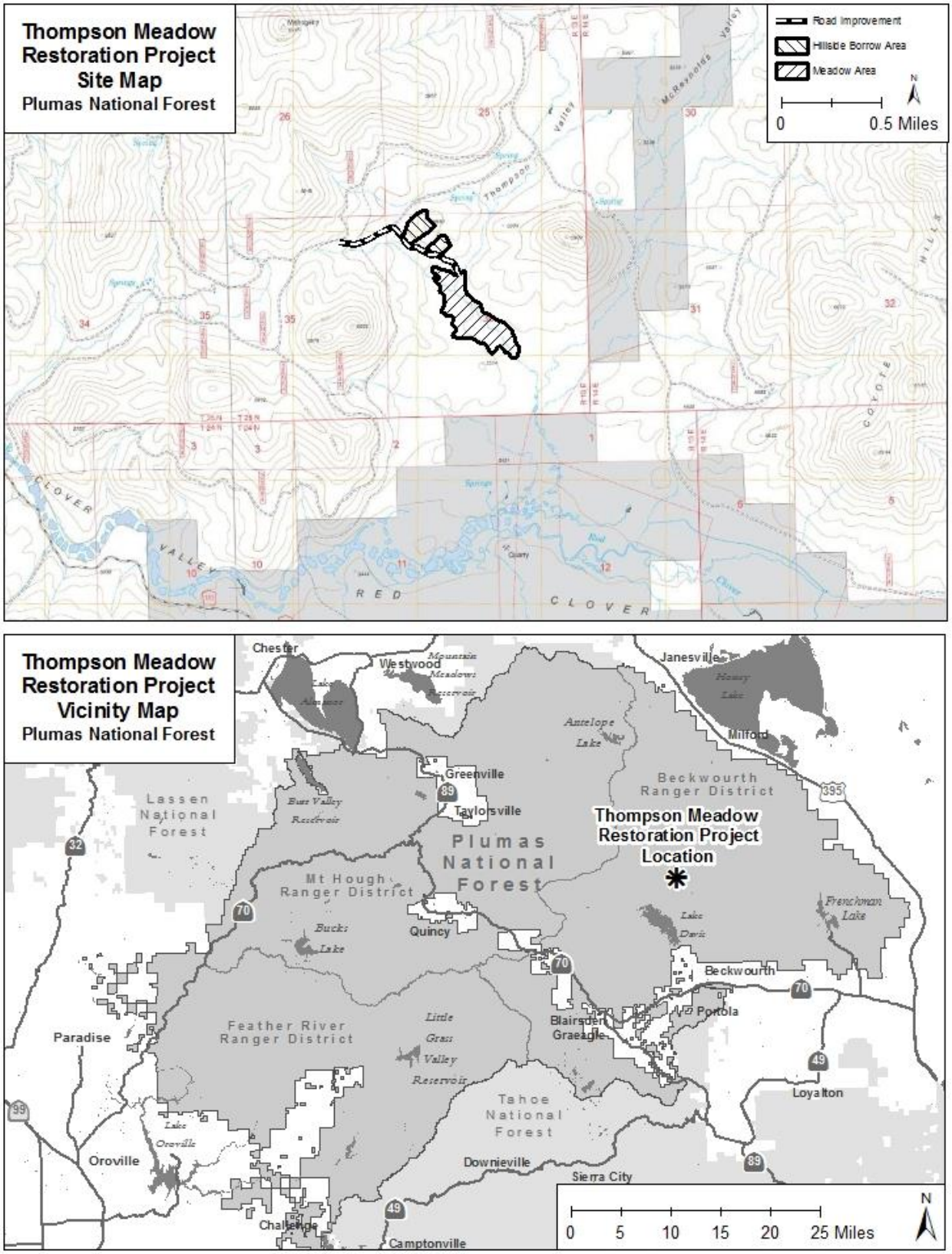

Figure 1. Vicinity Maps for Thompson Meadow Restoration Project

Chapter 2. Purpose and Need

2.1. Purpose of Project

The primary purpose of the proposed project is to restore channel/floodplain function to 0.68 miles of degraded stream channel and 47 acres of degraded meadow in order to reestablish the historical meadow water table elevation, stabilize eroding stream banks, improve water quality, attenuate flood flows, and restore meadow vegetation. A secondary purpose of the proposed project is to improve the quality and quantity of woody and non-woody riparian vegetation along stream reaches and to improve wildlife habitat and livestock forage. A full water budget evaluation will be conducted comparing pre- and post-project implementation conditions.

This proposed project is consistent with the goals and objectives outlined in the PNF LRMP, as amended by the 2004 SNFPA ROD, and the California Water Action Plan (CA Natural Resources Agency 2014). In addition, it helps to achieve the goals and objectives for aquatic, riparian, and meadow ecosystems and associated species, as described in the SNFPA ROD (p. 33-34).

2.2. Need for Action

There is a need to prevent further degradation of the stream and meadow system along Thompson Creek in order to improve low flow and peak flow conditions, meadow productivity, vegetative cover, and water quality by preventing further bank erosion and providing stable stream channel structure. Under existing conditions, the stream channel for Thompson Creek is incised within the historic (pre-1850) meadow (Wood 1975) to a depth of 4 to 10 feet, with incised depths of more than 7 feet being most prevalent. This incision means that the stream channel has been cut off from its historic floodplain. Without access to the historic floodplain, high energy flood flows are confined within the incision, causing vertical, highly eroded stream banks. This accelerated erosion during large floods has washed away willows, sedges, and other riparian vegetation that can stabilize stream banks and channel structure. Accelerated erosion has also impacted cultural resources in this area.

Under the existing condition, it is unlikely that any but the most extreme flood events would allow the channel to overflow onto the historic meadow. Therefore, much of the soil and bank-building sediment materials are transported through the degraded channel, rather than deposited onto the floodplain. Transport of sediments through the channel reduces water quality downstream because of in-channel sedimentation. In addition, shallow groundwater elevations have been altered due to the incised channel and the lack of a fully developed floodplain.

The incised stream channel has caused the historic meadow to dry out, leaving vast fields of sagebrush to dominate where wet meadow plant communities had once existed. This has caused a dramatic reduction in the quantity and quality of forage that was previously available to wildlife and livestock prior to channel incision. In addition, the unstable nature of Thompson Creek makes it difficult for mature riparian vegetation communities to become established because vegetation that does develop within the incision is susceptible to erosion during large flood events. Existing conditions impede desirable riparian and wet meadow plant communities from establishing in the project area.

2.3. Desired Condition

Existing conditions consist of rapidly eroding stream banks, unstable low flow channels vulnerable to large floods, and dry valleys dominated by sagebrush versus more diverse riparian habitat pre-1850. Recognizing the degraded nature of the existing conditions, the desired conditions as derived from ecosystem strategies, goals, and standards presented in the 2004 SNFPA ROD are listed below with page numbers from the ROD cited in parentheses for reference.

- Water quality meets the goals of the Clean Water Act and Safe Drinking Water Act. (p. 42)

- The connections of floodplains, channels, and water tables distribute flood flows and sustain diverse habitats. (p. 43)
- Meadows are hydrologically functional. Sites of accelerated erosion, such as gullies and headcuts, are stabilized or recovering. Vegetation roots occur throughout the available soil profile. Meadows with perennial and intermittent streams have the following characteristics: (1) stream energy from high flows is dissipated, reducing erosion and improving water quality; (2) streams filter sediment and capture bedload, aiding floodplain development; (3) meadow conditions enhance floodwater retention and groundwater recharge; and (4) root masses stabilize stream banks against cutting action. (p. 43)
- Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features. (p. 63)
- Species composition and structural diversity of plant and animal communities in riparian areas, wetlands, and meadows provide desired habitat conditions and ecological functions. (p. 43)
- Habitat supports viable populations of native and desired non-native plant, invertebrate, and vertebrate riparian and aquatic-dependent species. New introductions of invasive species are prevented. Where invasive species are adversely affecting the viability of native species, the appropriate State and Federal wildlife agencies have reduced impacts to native populations. (p. 42)
- Spatial and temporal connectivity for riparian and aquatic-dependent species within and between watersheds provides physically, chemically and biologically unobstructed movement for their survival, migration and reproduction. (p. 43)
- Significant cultural resource sites are stabilized and are no longer impacted by accelerated erosion.

2.4. Proposed Project (Federal Action) Alternative (Alternative A)

The USFS, PNF, Beckwourth Ranger District in partnership with DWR proposes to restore floodplain function and water table elevation within the degraded 47-acre Thompson Meadow along a 0.68 mile reach of Thompson Creek. Alternative A would employ a variety of restoration techniques along the channel, as described below and presented in Figure 2. The proposed project would be implemented using State and/or federal funds and/or non-governmental grant funds.

Channel floodplain connection and the meadow water table elevation would be restored using a variety of techniques. One technique is commonly referred to as “pond and plug” or partial channel fill. This technique would be applied to two reaches, one approximately 750 feet long at the upstream end of the project area and one approximately 400 feet long immediately downstream of the complete fill reach (described below).

The partial channel fill technique consists of eliminating stream channel incisions by filling part of the channel with earthen plugs utilizing locally sourced borrow material. The existing stream channel incision would be alternately widened (borrow sites) and partially filled, plugging the incision. As a result, stream flow would be directed to remnant channels on the meadow surface and the valley floodplain would again be reconnected to the stream channel. The channel reaches of the old incision between the earthen plugs (both borrow sites and non-borrow areas) would fill with groundwater, thus forming ponds. The upper partial channel fill reach would consist of a series of 5 earthen plugs and 5 borrow sites (ponded water) within the incised channel. Shallow areas within some channel borrow sites would be constructed to provide wildlife habitat. The lower reach would consist of 4 earthen plugs and 4 ponded water areas within the incised channel that are not borrow sites. The downstream partial channel fill reach would not be widened to generate plug material due to the potential for flood flows from the west side of the meadow to flow over the edge of the widened channel reaches (borrow sites) and drop more than one foot into the ponded water areas, creating an erosion hazard.

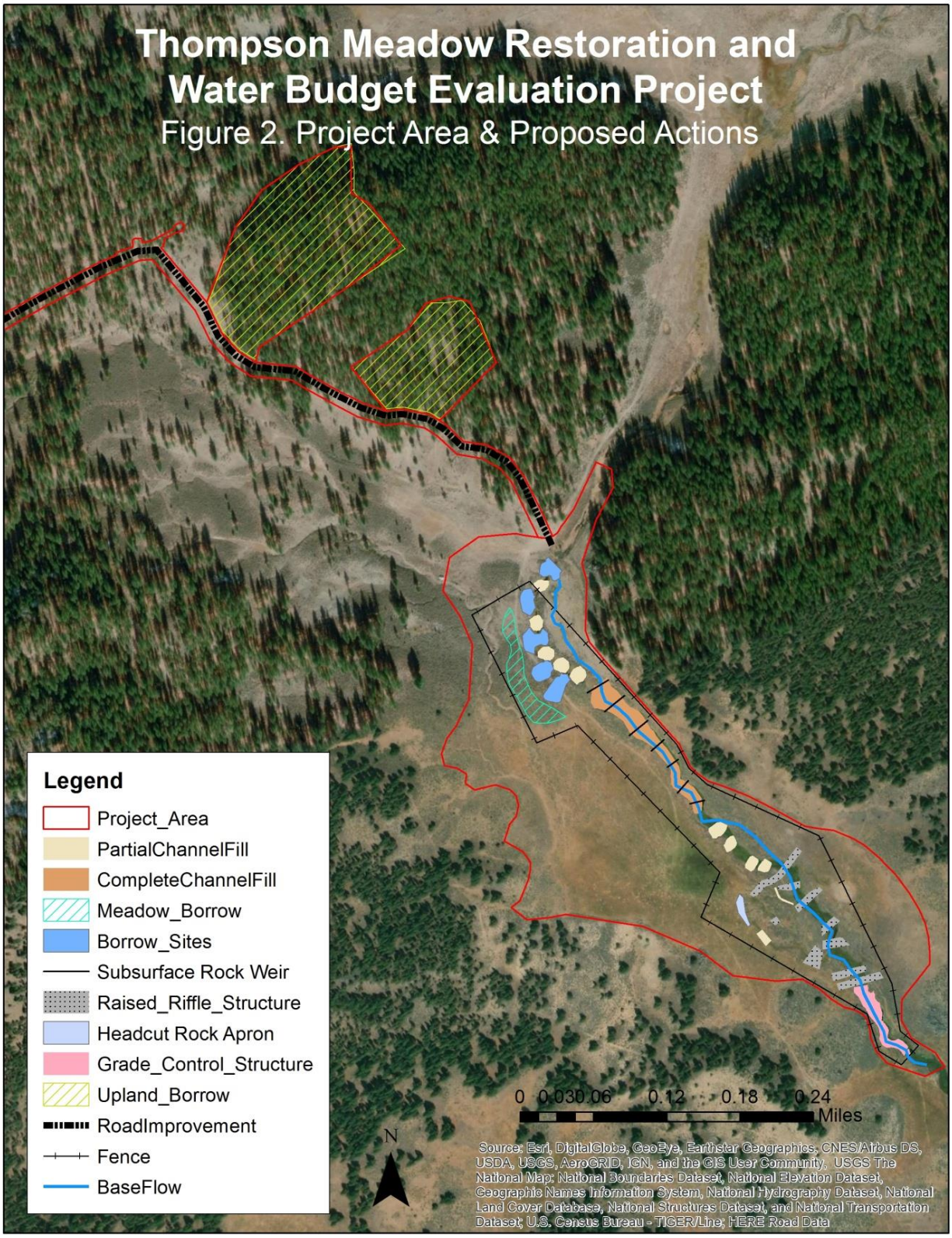

Figure 2. Project Area and Proposed Treatments

The plug elevations and widths would be designed to reduce the risk of head-cutting and surface erosion during major overland flows. To minimize the footprint of proposed project activities, all heavy equipment would stay within the confines of the work area, and material transport within the meadow

generally would not exceed 300 feet. Widening the incision (forming groundwater pond areas) to generate plug material would keep restoration costs feasible by providing an alternative to the costly import of soil and rock material. The total volume needed to construct the 9 earthen plugs would be approximately 5,500 cubic yards, with all but 2,000 cubic yards being derived from nearby channel incision widening borrow sites (ponded areas). The remaining fill material would be excavated from two borrow sites (described below).

Immediately downstream of the upper 750-foot partial channel fill reach, approximately 800 feet of the incised channel would be completely filled. The base flow channel would then be reconstructed within this filled reach. The partial channel fill technique would not be feasible in this reach because the base flow channel cannot be relocated. Because the meadow topography on the west side of the incision in this reach slopes toward the existing channel incision and the meadow topography on the east side of the incision rises sharply into a hillside, the channel is effectively confined to a single flow path. Therefore, any stream (base flow) channel restored to the surface of the meadow must flow in roughly the same area as the existing incision. Due to the slope of the meadow on the west and east side of the incision, the resulting base flow channel would generally be v-shaped in cross-section, with side slopes of roughly 10 percent on the western filled side and 10 to 20 percent along the eastern meadow hillside. To the maximum extent possible, the base flow channel location would occupy low areas along the existing meadow surface immediately east of the incision so that base flow would flow over ground that is already vegetated and undisturbed. In these locations, the base flow channel would be trapezoidal in shape, with the same side slopes, but with a bottom width of 1-5 feet where the bottom of the channel occupies flatter areas of the existing meadow east of the incision.

The incised channel through this reach averages approximately 50 feet in width and 7 feet in depth. Approximately 10,000 cubic yards of material would be necessary to fill this incision. To generate this fill material, two borrow sites would be excavated. The first would be a cut within the meadow, just west of the upstream partial channel fill reach (Figure 2). This area, approximately 0.8 acre in size, would be cut to a depth of about 3 feet (on average), generating approximately 4,000 cubic yards of material. The depth of this area would be about one foot higher than the restored water table, resulting in an area where vegetation roots could access the water table most of the year. Topsoil in this area would be set aside during the excavation and then put back in place, thus creating a low meadow area that would support seasonally wet meadow vegetation.

The second borrow site would be located on the forested hill to the north of the restored meadow along the access road. To generate the approximately 8,200 cubic yards of remaining fill material necessary for the complete fill reach, the upstream partial fill reach, 4 downstream plugs, and a small earthen plug in the headcut network on the southwest side of the meadow, areas on this hill would be excavated to average depths varying from 3 to 5 feet, and all trees (including snags) and shrubs within the excavation areas would need to be removed. The depth of cut would be tapered into the existing hillslope topography to blend the cut into the landscape. Topsoil in these excavated areas would be set aside and then spread over the cut areas to retain soil organic matter in the upper soil horizon. The excavated areas would be replanted with native species known to occur within the region, including native shrubs, forbs, and tree species. The potential borrow areas on the hill, totaling 13.64 acres, are identified in Figure 1. The total area of excavation needed to generate the borrow material would be much smaller, approximately 3 acres. However, larger areas are identified to allow flexibility in choosing the best material and best excavation location on the hillside. Trees in the upland borrow areas are all conifer species (no hardwoods except for shrub species). Given the approximate 3-acre areal extent of anticipated excavation and the existing tree density within the upland borrow sites, it is estimated that approximately 100 conifers with trunk diameters of greater than 6 inches would be removed. Within the excavated areas, the entire tree would be removed from the site, including roots, limbs, and boles.

To prevent erosion of the fill along the base flow channel in the complete fill reach, the extensive sedge communities that exist along the bottom of the existing incision would be excavated such that rooted

communities remain intact and these "sedge mats" would be placed (transplanted) along the full length of the base flow channel. Sedge would be transplanted in the lowest areas of the v-shaped or trapezoid-shaped channel and along the bottom and side slopes immediately adjacent to the bottom of the channel, continuously covering the full length of the baseflow channel with this protective vegetation.

The magnitude of stream flow through the project reach is very low for most of the year. DWR monitoring at the downstream end of the project area found an average maximum daily flow of 0.26 cubic feet per second (cfs) from April 1 through October 31 of 2016 (an above normal precipitation year). Given the low magnitude of stream flow that predominately exists in this meadow, stream flows through the complete fill reach would typically be flowing over transplanted sedge. Most of the filled area would function as floodplain, experiencing flow over the higher areas of the filled surface only in large flood events. It is expected that enough sedge exists that at least half of the surface of the complete fill reach would be covered with transplanted sedge. Therefore, the higher areas of the constructed fill where sedge is not transplanted would only experience flow stress during flood events, when the depth of flow along the baseflow location exceeds one foot. Existing flow monitoring data indicates that these large floods occur infrequently and last for short duration (see more info in the Hydrology section below). To revegetate and protect these higher side slope areas of fill that are not transplanted with sedge, native meadow species would be seeded and willow stakes transplanted.

There is a small risk that, prior to establishment of this vegetation, extreme flood flows could erode the higher floodplain areas of the fill, creating a scoured channel along the fill that is unprotected by sedge. To prevent the creation of a long, scoured channel that could divert base flow around the designed base flow channel, rock "sleeper" weirs would be installed along cross-sections of the filled channel. The weir cross-sections would extend from the western edge of the filled area, through the base flow section, and into the toe of the eastern hillside. These weirs would consist of large rock mixture (typically 2 feet in diameter maximum) that would be installed such that the top of the rocked cross-section would be just a few inches below the restored meadow surface. Thus, the rock would not be visible unless areas of the floodplain and/or base flow channel scoured significantly. The rock would prevent such scour from migrating upstream in a long headcut, essentially halting any headcut from migrating upstream past a buried sleeper weir. The fall down the length of the complete fill reach would be approximately 12 feet and sleeper weirs would be installed at least at every 2 feet in drop. Therefore, up to 7 sleeper weirs would be constructed. The length of each weir would be approximately 75 feet and the width about 3 feet. The sleeper weirs would require approximately 175 cubic yards of large rock, which would be imported from the nearby Forest Service Crocker Pit, approximately 11 miles from the project area.

Below the downstream 4 plugs, the stream channel would be held in its current location by a series of 7 rock "raised riffle" structures along a reach approximately 700 feet in length. Imported rock (2 feet maximum size) would be used to create structures that would raise the channel elevation to within 1.5 feet of the meadow surface, effectively restoring the water table and spreading large flood flows onto the meadow floodplain. The shallow channel incision, which is approximately 4 feet deep, would likely require about 150 to 200 cubic yards of imported rock per structure, totaling 1400 cubic yards of material. Rock would be imported from the Crocker Pit.

To anchor the proposed project, a rock "grade control structure" would be constructed at the downstream end of the restored meadow. This armored structure would be necessary to transition stream flow from the restored meadow elevation into the incised channel outside of the project area. The control structure would be approximately 8 feet high at its upstream end and would slope gently, dropping 4 or 5 feet for every 100 feet of length. Step pools would be constructed within the grade control structure's base flow channel to provide fish passage. The structure would be up to 300 feet long, requiring up to 4,000 cubic yards of imported rock from the Crocker Pit, with rock diameters varying from a few inches up to 3 feet. To prevent end-run headcut channels, the grade control

structure would be located at a rock outcrop area where the valley and meadow floodplain would funnel flood flows over the hardened structure.

The final component of the proposed design would treat several headcut channels that have formed within the southwestern portion of the meadow. These channels have formed due to the comingling of ephemeral tributary flows across the west side of the meadow that then flow into the downcut Thompson Creek mainstem. To treat these headcut channels, two rock raised riffle structures would be constructed within the main headcut channel to raise the channel elevation close to the meadow surface and match the water table elevation that would be established by the raised riffle structures in the Thompson Creek mainstem. In addition, the furthest upstream Thompson Creek riffle structure would be extended laterally to treat one of the headcut channels, and the tributary channel would enter Thompson Creek and flow over the two furthest downstream riffle structures. Additionally, one earthen plug structure would be constructed with 200 cubic yards of fill material from the upland borrow sites to treat the furthest west headcut channel. Finally, a rock apron (with 2-foot diameter maximum) would be constructed at the upstream edge of the headcut network to transition tributary flows down a three-foot drop to the elevation of the tributary raised riffles. A total of 850 cubic yards of needed rock material would be imported from the Crocker Pit to construct the riffle structures and rock apron.

To provide soil stabilization, willow cuttings would be planted along pond and plug edges, and along the stream banks where the stream would remain in its current location. The raised water table in these areas would result in establishment of willow communities where the cuttings are planted. Approximately 1,000 3-foot-long willow cuttings would be collected within the Red Clover watershed. Large areas of sedge vegetation currently exist within the incised channel. This vegetation that would be buried or continually submersed as a result of proposed actions would be removed and replanted at key points on treated areas such as filled headcuts, plugs, pond sides, or along the remnant channel where additional vegetation is needed to prevent soil erosion due to concentrated flows. For partial channel fill treatments, topsoil from the excavated areas would be removed, stockpiled, and later spread over the constructed plugs. Plugs would be seeded and mulched with locally collected native seed and weed-free straw. Pond margins would be planted with available sedge mats, willow cuttings, and native riparian grasses. Revegetation efforts would be focused primarily in areas that need vegetative armoring or where implementation of the project has resulted in bare surfaces. It is expected that revegetation of disturbed areas would take approximately three years.

Within the Thompson Creek grazing allotment, approximately 6,200 feet of wildlife friendly barbed wire fence would be constructed around the meadow restoration treatments to prevent grazing impacts while meadow vegetation recovers and becomes established. This fencing would be constructed using the same funding secured for construction of the proposed project treatments. Future maintenance of the fence would be the responsibility of the grazing permitee. Wildlife fencing specifications include: 1) fencing wire placed on the side of the fence posts where the domestic animals are located; 2) smooth wire or rounded rail for the top, smooth wire on the bottom; 3) height of top rail or wire would be 42 inches or less; 4) at least 12 inches between the top two wires; 5) at least 16 inches between the bottom wire or rail and the ground; and 6) posts at minimum 16 foot intervals. Approximately four escape gates would be built into the fence to allow the grazing permittee to move stray cattle out of the exclosure. The approximate fence location is shown on Figure 2, although minor adjustments to this location could be made to improve the stability of the fence and facilitate future fence maintenance. At the upstream end of the project area, the fence would cross the Thompson Creek mainstem near the downstream edge of the first plug. The surface of this plug would be armored with small rock (a mixture of rock with 6-inch diameter maximum) to prevent plug erosion when cattle cross Thompson Creek.

In the future (as soon as 3 years after project construction), cattle could be allowed within this grazing exclosure for short “flash grazing” periods, once Beckwourth Ranger District range specialists have determined that meadow vegetation is firmly established. The fenced area would be monitored post-

project with an annual rotation letter to the permittee adjusted each year to facilitate a recovering trend. Once grazing resumes, the project area would be monitored annually as part of the USFS's management of the grazing allotment to ensure a continuing stable or improving vegetative and hydrologic trend. The timing and intensity of grazing within the pasture area outside of the fenced area would continue similar to recent seasons and would not be affected by project construction.

Under existing conditions, the access road (0.72-mile long) to the meadow is too narrow for trucks to haul imported rock and the hillside borrow material to the construction site. The road would be widened to approximately 12 feet and rolling dip structures would be installed to frequently drain runoff from the road, preventing rilling or rutting of the road surface. The road surface would be out-sloped (tilted away from the hillside at roughly 4 percent) to further disperse runoff from the road surface. Disturbed areas along edges of improved road (approximately 2 - 4 acres) would be re-vegetated with native grass seed.

Implementation of all proposed restoration techniques, with the exception of the fence construction, native seeding, and planting of willow cuttings, would require the use of heavy equipment. Estimated construction time is approximately four to six weeks. Anticipated construction equipment that would be utilized at the site includes: two excavators, two wheel loaders, one track loader, one water truck, two to three dump trucks, and one roller compactor. Additionally, a dozer and a grader would be needed to reconstruct the access road and compact the fill areas, and three dump trucks would haul the necessary rock from Crocker Pit over roughly 3 weeks. A chainsaw would be used to fell trees in the proposed upland borrow site, and a portable water pump would be used to for diverting water around work areas (if needed), fire prevention, and dust control.

Interrelated and interdependent project actions include five years of post-project monitoring and assessment of the project's structural integrity within the project area by USFS and DWR staff to identify potential project maintenance needs. If it is determined that any occurring erosion is affecting the structural integrity of the project, maintenance actions may be taken to ensure the project continues to meet desired conditions (connected floodplain with stream channel; improved water quality and habitat conditions). Maintenance actions would be similar to those proposed for the restoration listed above (i.e. channel fill; use of rock and/or vegetation for stabilization), and may require the use of heavy equipment. Any maintenance actions taken would be within the same project footprint.

Table 1 summarizes Alternative A proposed project activities. Proposed construction would be restricted to the dry season, beginning as early as August 15, 2020 and continuing as late as November 15 of the same year in which construction begins. Although work would be performed during the dry season, any water in the channel would be diverted around the treated stream channel reach during implementation to protect water quality and downstream aquatic life (see Project Design Feature Criteria section). Diversion of water around the channel work areas would temporarily disrupt downstream flows (i.e. slow stream flow). DWR monitoring at the downstream end of the project area found an average maximum daily flow of 0.18 cubic feet per second (cfs) from August 15 through November 1 of 2016 (an above normal precipitation year).

Table 1. Summary of proposed restoration techniques for the Thompson Meadow Restoration Project.

Activity	Description
Meadow restoration	• Approximately 750' of partial channel fill with the incised channel being alternately filled (earthen plug) and widened (borrow site resulting in ponded water); 3,500 cubic yards of needed fill material would come from widened incised channel • Approximately 400' of partial channel fill with the incised channel intermittently filled (earthen plug) with no widening of unfilled segments (no borrow sites but ponded water between earthen plugs); 2,000 cubic yards of fill material needed would come from the meadow cut and/or upland borrow sites • Approximately 800' of complete channel fill; 10,000 cubic yards of needed fill material to come from meadow cut and upland borrow sites • Approximately 7 rock sleeper weirs, requiring a total of approximately 175 cubic yards of large rock, constructed just below finished grade of the complete fill • Meadow cut (0.8 ac) to floodplain elevation would provide 4,000 cubic yards of fill • Upland borrow sites would provide approximately 8,200 cubic yards of fill material • Seven (7) rock "raised riffle" structures along 700' incised channel reach; 150-200 cubic yards of rock per structure from the USFS Crocker Pit • Rock grade control structure 300' long; 4,000 cubic yards of rock from Crocker Pit • Headcut treatments with raised riffle structures, a rock apron, and one earthen plug; 850 cubic yards of rock from Crocker Pit and 200 cubic yards of fill from upland borrow sites
Road improvement	• Approximately 0.72 mi of existing road would be widened to approximately 12 ft to provide hauling truck access between upland borrow sites and staging area to the project area • Rolling dip structures and a 4% road surface tilt away from the hill slope would be incorporated • Disturbed areas along edges of improved road (approximately 2-4 acres) would be revegetated with native grass seed
Re-vegetation	• Native riparian vegetation in existing channel bottom would be used to partially cover and stabilize newly constructed restoration features; any remaining bare areas within the meadow would be seeded with native wet meadow and wetland species, collected under USFS supervision at a nearby location within the watershed • All disturbed ground would be seeded with appropriate native seed • The upland borrow sites would be replanted with a mix of native shrubs, forbs, and conifer species (approximately 2.5 acres)
Grazing Management	• Approximately 6,200 ft of wildlife friendly fence would be constructed around the 0.68 mi of restored and revegetated channel to protect from cattle and allow vegetation 2 to 3 years to reestablish

Maintenance	• Post-implementation performance monitoring of all project features would be conducted annually for five years by DWR and USFS engineers to identify any occurring erosion that would trigger a need for maintenance due to effects to the structural integrity of the proposed project; any maintenance actions taken would be within the same project footprint and consist of similar proposed restoration techniques

2.5. Project Design Criteria

As part of project design specifications and construction practices, USFS and DWR incorporated the following design criteria into the proposed project that avoid or minimize impacts to environmental resources:

- Construction of the proposed project would occur during the low flow period.
- In the upland borrow sites a sufficient amount of snags and large down wood would be retained to meet PNF LRMP standards. Per Forest Plan standards, an average of three snags per acre with diameter breast height of greater than 15 inches would be retained, and three or more large down logs (greater than 15 inches in diameter) would be retained on the ground per acre treated (USDA 2004). Wood to be placed on the ground shall be in early stages of decay.
- Temporarily impacted riparian habitat areas would be revegetated with native riparian species known to occur within the region. Plantings would be monitored by the USFS for three (3) years to ensure greater than 70% reestablishment of riparian habitat.
- Impacted forest habitat areas would be revegetated with native species known to occur within the region. Plantings would be monitored by the USFS for three (3) years to ensure greater than 70% reestablishment of forest habitat.
- Equipment, materials, or crews would not be staged in areas infested with invasive plant species where there is a risk of spread to uninfested areas.
- Require all off-road equipment and vehicles used for project implementation to be weed-free. All equipment and vehicles must be cleaned of all attached mud, dirt, and plant parts at a vehicle washing station or steam cleaning facility before the equipment and vehicles enter the project area. In addition, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds.
- Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds. If seeding or planting will be done, use only locally collected native seed sources. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed and at a similar elevation whenever possible. Persistent non-natives such as timothy, orchard- grass, or ryegrass should be avoided.
- Any imported rock, fill, or other materials would be certified weed free. Onsite sand, gravel, rock, or organic matter would be used, where possible.
- The USFS would obtain a Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB), a 404 permit from U.S. Army Corps of Engineers (USACE), and if needed, a Lake and Streambed Alteration Agreement (LSAA) from CDFW. USFS and DWR would adhere to all conditions and requirements of the regulatory permits.
- Roads and construction disturbance areas would be watered, as needed, to minimize and control dust.
- If needed, a RWQCB approved Storm Water Pollution Prevention Plan (SWPPP) would be prepared by a Contractor. The SWPPP would incorporate appropriate temporary construction site BMPs to implement effective handling, storage, use, and disposal practices for hazardous materials

during construction activities and would include procedures for appropriate response to an accidental release of hazardous wastes / substances.

2.6. No Action Alternative (Alternative B)

Alternative B takes no action and serves as a baseline for comparison for the action alternative. Under Alternative B, no treatments would occur within Thompson Meadow so the existing conditions presented above under the "Need for Action" section would remain. This alternative would not restore the floodplain function of the meadow or provide the resulting benefits to riparian habitat, nor would it provide monitoring information to better understand and quantify the hydrologic and environmental effects of meadow restoration efforts.

2.7. Alternatives Considered but Eliminated from Further Discussion

Federal agencies are required to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Alternative A includes state-of-the-art techniques for achieving the proposed project purpose. No public comments were received in response to the notice of the Proposed Action regarding the development of other alternatives.

2.8. Permits and Approvals Needed

Table 2. Likely required permits to be obtained for the Thompson Meadow Restoration Project.

Agency	Permit/Approval	Required For	Status
U.S. Army Corps of Engineers	Clean Water Act Section 404 Permit	Discharge of dredged or fill material into water of the United States	Permit would be obtained prior to approving the project for construction.
Central Valley Regional Water Quality Control Board	Clean Water Act Section 401 Water Quality Certification Clean Water Act Section 402 General Construction Activity Stormwater Permit	Discharge of pollutants into waters of the United States Stormwater discharges to navigable waters associated with construction activity for greater than one acre of land disturbance	Certification would be obtained prior to approving the project for construction. If needed, permit would be obtained prior to approving the project for construction.
California Department of Fish and Wildlife	Fish and Game Code Section 1602 Lake & Streambed Alteration Agreement	Any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake	If needed, permit would be obtained prior to approving the project for construction.

Chapter 3. Public Involvement and Tribal Consultation

The project proposal was listed in the USFS Schedule of Proposed Actions on October 26, 2017. Scoping letters describing the proposed action and apprising the preparation of an EA/IS by USFS and DWR were distributed on November 8th, 2017 by the USFS to various agency stakeholders, organizations, and individuals of the public within the vicinity of the proposed project in accordance with 36 CFR 218, Subparts A and B. The scoping period was held from November 8 to December 8, 2017. Over 30 individuals, organizations, groups, Indian tribes, and Native American organizations were contacted with project information initiating the scoping period. Project proposal information was sent to local agency officials such as Plumas County Board of Supervisors and Feather River Resource Conservation District; Native American Tribes; special use permittees; and adjacent and downstream landowners. The USFS consulted with individuals, federal, State, tribal, and local agencies during the development of this EA/IS. A list of those consulted is available in the Coordination and Consultation section and further details are provided in the project record at the Beckwourth Ranger District in Blairsden, California. These actions also meet the requirements of CEQA Guidelines Section 15063 (g).

Formal tribal consultation was initiated by the USFS as per Section 106 of the National Historic Preservation Act (NHPA) on February 17, 2017. Letters and information regarding the proposed project were sent to Greenville Rancheria, the Susanville Indian Rancheria and the Washoe Tribe of Nevada and California; all three federally recognized Indian tribes with traditional territory encompassing this area. Consultation was also initiated with the Maidu Summit Consortium that consists of a variety of members representing both federally recognized and non-recognized tribes, organizations and individuals. The USFS met with the Washoe Tribe of Nevada and California on July 11, 2017 in Gardnerville, Nevada to discuss the proposed project. A follow-up field meeting was held with tribal members, including the Tribal Historic Preservation Officer (THPO), on July 18, 2017. On September 13, 2017 another field meeting at Thompson Meadow occurred between PNF cultural resource managers and members of the Greenville Rancheria and Susanville Indian Rancheria representing Mountain Maidu interests. This meeting was attended by the Susanville Indian Rancheria THPO. Concerns were expressed regarding the protection of significant cultural resource properties in proximity to the project area/APE but there was also general support for the restoration goals of the project. The presence of a tribal monitor during project implementation in proximity to cultural resource properties was requested by all tribal consultants.

Consistent with its Tribal Engagement Policy and the California Natural Resources Agency's Tribal Engagement Policy, DWR mailed tribal engagement letters on February 12, 2018 to the Greenville Rancheria, Susanville Indian Rancheria, and Washoe Tribe of California and Nevada. To date, no comments have been received resulting from this engagement effort.

In an effort to reduce paper use, the Forest Service encouraged electronic correspondence throughout the scoping process. Instructions for submitting comments were included in the mailed scoping materials. Two comments were received during the scoping period - one from downstream water users/landowners, and one from the USDA Natural Resources Conservation Service (NRCS) - Quincy Field Office. The comment letter from the downstream water users/landowners opposes the project primarily due to the belief that the project would infringe on their water and property rights. NRCS comments were supportive of the project stating the project provides an opportunity to study hydrological effects of meadow restoration, with the data helping to shape future meadow restoration efforts by State, federal, and non-governmental organizations (NGOs) throughout California.

Based on the comments received from the public (see *Issues* section), the Interdisciplinary Team developed a list of issues to address and a response to each comment. These issues and responses are listed in the Issues section below.

3.1. Issues

Issues (cause-effect relationships) serve to highlight effects or unintended consequences that may occur from the proposed action, providing opportunities during the analysis to reduce adverse effects and compare trade-offs for the responsible official and public to understand. Issues are best identified during scoping early in the process to identify the environmental effects to consider and develop proposals that minimize environmental impacts. However, due to the iterative nature of the NEPA process, additional issues may come to light at any time.

An issue should be phrased as a cause-effect statement relating actions under consideration to effects. An issue statement should describe a specific action and the environmental effect(s) expected to result from that action. Cause-effect statements provide a way to understand and focus on the issues relevant to a particular decision.

There is no set of standard issues applicable to every proposal, so it is important for the Responsible Official to consider a variety of laws, regulations, executive orders, and input, with the help of the interdisciplinary team. The Responsible Official approves issues to analyze in depth by the interdisciplinary team in the environmental analysis (FSM 1950.41). It is often helpful to group similar issues by common resources, cause-effect relationship, common geographical area, or those linked to the same action.

The Forest Service separated the scoping comments into two groups: Category A and Category B issues. Category A issues were defined as those directly or indirectly caused by implementing the proposed action. Category B issues included those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher-level decision; 3) irrelevant to the decision to be made; 4) conjectural and not supported by scientific or factual evidence; or 5) that could not be phrased as a cause-effect relationship.

3.1.1. Category A Issues

Issue 1. Less water would be available late season to downstream water rights holders as a result of restoring the meadow

In response to the November 2017 public comment period for this project's proposed action, a group of irrigators and agricultural producers in Indian Valley wrote a letter expressing opposition to the proposed project, stating that similar past restoration projects on Red Clover Creek have resulted in less water available to downstream irrigators. Red Clover Creek is a large tributary stream, entering Indian Creek at the head of Genesee Valley. To date, a total of nine meadow floodplain restoration projects totaling 975 acres have been implemented in the Red Clover Watershed from 1985 to 2013. Three of these projects comprise the bulk of this restoration, totaling 788 acres, including approximately 7 continuous stream miles of partial channel fill restoration (commonly referred to as "pond-and-plug") that was constructed upstream and downstream of Chase Bridge between 2006 and 2011 and an additional 3-mile project in 2013 near the headwaters of Red Clover Creek in Dotta Canyon. The nearest downstream irrigation diversion on Red Clover Creek is located approximately 10 miles downstream of any of these restoration projects.

While the comment mentioned "numerous studies" that demonstrated that less stream flow would be available to downstream irrigators, no specific studies were cited. The comment does allude to "seepage run" monitoring the USFS performed during the low flow seasons of 2011 and 2012, which was performed to ascertain whether certain short reaches along Red Clover Creek, both within and outside of restored areas, were experiencing gains in surface flow (due to groundwater inflow to the surface channel monitored) or losses of surface flow (seepage from the channel to groundwater). Late

season flow, which is the primary concern expressed in the irrigators' comment, is highly dependent upon groundwater and surface water interaction. All meadow streams, whether healthy, degraded, or restored, experience inflows of groundwater along certain recharge reaches and seepage to groundwater along other reaches, primarily due to geologic variability along the stream reaches. The 2011 and 2012 seepage run measurements did indicate an increase in the rate of late-season stream flow loss for a restored reach of Red Clover Creek that appeared to be a losing reach prior to restoration (Hoffman et al 2013). Additionally, data from a partial channel fill project constructed on Long Valley Creek (approximately 12 miles southeast of Quincy, CA) indicated that the project may have resulted in a decrease in late season flow immediately downstream of the treated reach, at least for the first few years after restoration (Hoffman et al. 2013).

These data indicate that decreases in late season flows may occur within or immediately downstream of meadow restoration projects, likely due to increased evapotranspiration resulting from the raised water table or due to beaver activity that spreads surface flow across the restored meadow floodplain. However, no data exist that demonstrate reduction in surface water flows several miles downstream of the restoration area. A statistical analysis of 11 years of continuously recorded stream flow data collected at Notson Bridge, located 6 miles downstream of the Red Clover Creek partial channel fill restoration projects and 5 miles upstream of the closest Red Clover agricultural diversion, indicated no apparent statistical trend (no increase or decrease) in stream flow during the late season (Cawley 2011). While Red Clover Creek at this location does include flow from several tributaries that enter the creek downstream of the restoration projects, the effects of these flows were included in both the pre- and post-meadow restoration analyses. The analysis concluded that any change in late season flow due to the partial channel fill treatments is not measurable at a point well upstream of the nearest agricultural diversion.

More recently, summer base flows in Deer Creek through Indian Valley on the Eldorado National Forest increased five to 12 times after restoration in 2012 despite prolonged drought conditions in 2012 through 2015 (Hunt et al 2018). Even at the height of the drought in 2015, summer base flow leaving the meadow was five times greater or more than prior to restoration (Ibid). A study done in 2015 by the USFS in cooperation with the National Fish & Wildlife Foundation and DWR found historical records of stream flow downstream of eroded meadows were less consistent in relation to precipitation than records from the Merced River downstream of large, non-eroding meadows. Restored meadows with flow-through streams were shown to retain groundwater and baseflows during successive drought years, while eroded/incised meadows had significant decreases in groundwater retention and flows in sequential drought years (USDA 2015).

For late spring and early summer flows, i.e. the early portion of irrigation season, a study on Trout Creek at Lake Tahoe demonstrated a significant increase in streamflow after meadow restoration, presumably due to retention of spring snowmelt and runoff within meadows soils, which is then slowly released to the stream (Tague 2008). Cawley also found an increase in streamflow during this snowmelt recession period at the Big Flat Meadow restoration project (on Cottonwood Creek, tributary to Last Chance Creek) (Cawley 2011).

The comment letter correctly states that late season flows within the restored reach of Red Clover Creek may have been higher in the 1960s and 1970s than in recent years. Hydrologic bulletins published by DWR documented year-round stream flow monitoring that occurred at Chase Bridge (which is located within the 7 miles of pond-and-plug restoration that was implemented between 2006 and 2011) on Red Clover between 1964 and 1975 (DWR 1964-1975). While only during one year within this monitoring period was the minimum flow reported to be zero (in 1970), the minimum flow has commonly been zero at this location in the past 25 years, both before and after restoration (Hoffman 2013). This change can be clearly correlated, at least in part, to climactic changes. The period of DWR's monitoring were years with significantly higher precipitation than the years following the Red Clover Creek partial channel fill treatments, particularly the four consecutive years of drought that occurred in California from 2012-2015. Snowpack measurements at DWR's nearby Abbey monitoring

station demonstrate significantly lower snowpack measurements during the years following pond-and-plug restoration than during the 1964-1975 DWR monitoring period. See data details in the Hydrology report for this EA/IS. Similarly, Pacific Gas and Electric documented an estimated 23% reduction in average annual flow on East Branch North Fork Feather River for the 1976-2009 period, compared with the 1950-1975 period, with decreased snowpack cited as a likely cause (Freeman 2010).

As stated in the purpose section of this document, a full water budget evaluation will be made regarding the proposed project. The Thompson Meadow Restoration and Water Budget Evaluation Project includes further investigation of late season flow effects of meadow restoration and will conduct a comprehensive pre- and post-project hydrologic analysis that includes at least 5 years of pre-project and 5 years post-project data collection. Given the size and location of the proposed Thompson Meadow Restoration Project, and its relatively minor contribution to Red Clover Creek, , it is expected that the water budget evaluation project will confirm that effects to late season downstream flow available to downstream water rights holders, either positive or negative, are immeasurable and negligible.

Issue 2. Ponded water as a result of the restoration techniques proposed would create habitat that was not historically present on the landscape

The Indian Valley comments stated that ponded water from the proposed project would create a habitat that was not historically present on the landscape. Montane meadow ecosystems in the Sierra Nevada are very dynamic, continually evolving in response to droughts, floods, beaver activity, and anthropogenic alterations. In a properly functioning meadow ecosystem, seasonally saturated meadows often have areas of standing open water. Beaver have historically been an important component of meadow ecosystems, including the meadows of Red Clover Valley. Beaver have been identified as a keystone species, whose presence promotes complex habitats capable of supporting a wide range of native animal and plant species. Beaver dams spread water out onto the meadow floodplain in high flow events and create backwater ponds during the low flow season (Lundquist 2016). The Indian Valley comments incorrectly state that the ponds created by the proposed restoration would be impoundments of water, similar to instream dams that are used to store water by permitted water right holders. Rather, the ponded areas which would form within the abandoned sections of incised stream channel are an artifact of the partial channel fill technique and are merely an expression of groundwater present in the restored meadow (SWRCB 2011). When the incised channel is partially filled to the meadow surface and the water table is restored to its pre-degradation elevation, groundwater occupies the sections of the channel that were not filled with earthen material. Over a time period of hundreds to thousands of years, these ‘ponds’ would fill in with sediment and vegetation. Similar to beaver ponds, these pooled surface water features provide habitat for water fowl, bats, and aquatic organisms, including fish, as has been observed within the Red Clover/McReynolds Creek Restoration project area (completed in 2006) just downstream of the proposed project (Point Blue Conservation 2011 Annual Report). The ponded water habitat to be created, therefore, will be similar to and fulfill the same functions as habitat that was historically present on the landscape.

Issue 3. Proposed project design would cause instability

The Indian Valley comments provided photos of erosion within areas of Red Clover Valley that were treated by partial channel fill technique (commonly referred to as “pond-and-plug”) and suggest that the technique is inherently unstable in resisting erosion from high stream flows. All stream or meadow restoration techniques carry risk of erosion during floods, including techniques that utilize large rock riprap to harden stream banks and beds (Thompson 2002).

The partial channel fill meadow restoration projects that have been implemented in Plumas County since 2001 have withstood several years of significant flooding, with the vast majority of projects still meeting the restoration objective of restoring water tables and spreading high flows across the meadow floodplain. The most comprehensive field review of the condition of constructed partial

channel fill projects was performed by PNF staff in 2011 for projects constructed between 2001 and 2007 in the Last Chance Creek watershed. Eighty-two constructed plugs were reviewed, with just over half of those exhibiting no evidence of flow erosion. Thirty percent of the plugs exhibited erosion of concern (an erosion rill at least 9 inches deep or a rill that runs the full length of the plug), but small beaver dams had effectively stabilized many of those rills. Additionally, 6 plugs have been stabilized with rock or other techniques since the 2011 survey. Field checks conducted in 2018 for the Last Chance Creek watershed projects found no additional significant plug erosion issues following the heavy floods of 2017. See plug condition survey data details in the Hydrology report for this EA/IS.

A partial channel fill project can withstand some segments of plug erosion. Project objectives to restore the meadow water table and floodplain connectivity are compromised only when a rill across a plug develops that is lower than the typical meadow surface stream channel. Only 3 of the 82 plugs (4%) were completely breached by flood flows, meaning that the stream's lowest seasonal flows run through the plug, causing a lowering of the water table and loss of floodplain connection in those short segments of the restored reach. Field checks conducted in 2018 for the Last Chance Creek watershed projects found no additional significant plug erosion issues following the heavy floods of 2017. The 3-mile-long project that was constructed on USFS lands near the Poco Creek tributary in 2010-2011 has experienced the most plug erosion of any partial channel fill restoration constructed on Red Clover Creek (this project appears to be the subject of the commenter's photos). However, the project is still largely meeting the objective of raising the meadow water table and restoring floodplain connection, primarily due to beaver activity that has stabilized some spots of plug erosion and also due to stout sedge vegetation that is maintaining the designed plug elevations along the downstream and upstream edges of the plugs. The 4 miles of partial channel fill restoration on Red Clover and McReynolds Creek on private lands immediately upstream of the USFS Poco Creek project has remained remarkably stable throughout all floods since its construction in 2006. Similarly, the 2.6-mile-long Dotta Canyon project along the upper reach of Red Clover Creek has experienced very little plug erosion since its construction in 2013. See further details in the Hydrology report for this EA/IS.

For Thompson Meadow, if future floods cause erosion of some segments of the constructed project, volumes of fine sediment eroded would be limited by large rock design features such as the grade control structure at the downstream end and the rock sleeper weirs buried within the complete fill reach. Therefore, the design is such that minimal to no damage would occur to the channel immediately below the project area. At a larger watershed scale, sediment volumes from such an erosion event would be small compared with sediment that typically flows during large floods and would not damage private or public structures located further downstream on Red Clover Creek, including Chase Bridge, Notson Bridge, or irrigation diversion structures near the mouth of Red Clover Creek.

3.1.2. Category B Issues

Issue 4. Filling the incised channel would eliminate exposed banks that provide habitat for bank swallows

The Indian Valley comments state there are bank swallow nest holes in the exposed banks along Thompson Creek. Point Blue Bird Conservation Science (formerly Point Reyes Bird Observatory) has conducted annual avian surveys in Red Clover Valley and vicinity for the past eight years. During these surveys, four bank swallow individuals were observed in the McReynolds Project area (2015) and 4 individuals in Dixie Creek (2017) to the east of Thompson Meadow. No bank swallow nesting colonies have been observed in the Red Clover Valley area to date (personal communication, Ryan Burnett, Point Blue Sierra Nevada Group Director, 2018). In addition, avian surveys conducted by DWR in April through October of 2006 and 2007 did not detect bank swallows in the proposed Thompson Meadow Restoration Project area. Surveyors conducting amphibian surveys within the project area in May and August of 2017 also did not observe any bank swallows.

The exposed banks of Thompson Creek do not provide sufficient suitable habitat to support a bank swallow colony. Vertical bank heights at nesting colonies in California average 3.3 meters or 10.8 feet

(Garrison 1998). The average vertical bank height along Thompson Creek within the project reach is 2.1 meters or 7 feet. Banks or bluffs must be at least 1 meter or 3.2 feet tall to have some predator deterrence values, and some source of ongoing erosion is usually always present (Ibid). While current bank conditions do have continual erosion, much of the project reach is not as suitable for nesting colonies due to shorter vertical bank heights. Therefore the proposed project area does not provide suitable habitat for bank swallow nesting and, as discussed above, no bank swallows have been seen in the area.

Issue 5. Downstream water rights' holders should be compensated for perceived water loss

The Indian Valley comments stated that downstream water rights holder should be compensated for water loss caused by the proposed project. The proposed project is intended to reconnect the stream channel to its naturally-evolved floodplain. This is expected to induce a minor reduction in peak flood flows with minor enhancements of flood recession and baseflows. Reconnecting the stream channel to the naturally-evolved meadow floodplain reduces high velocity stresses on channel aquatic organisms. The floodplain would be hydrologically reconnected, resulting in shallow groundwater levels returning to the near-surface, reinvigorating mesic and wet meadow vegetative communities (Cornwell & Brown 2008; Tague et al 2008).

The Indian Valley comments cite a 2011 resolution from the Plumas County Board of Supervisors which resolved that the County would work with interested parties so that planned and implemented stream and meadow restoration projects would protect the holders of water rights (Plumas County Resolution 2011-7685). In response to a 2011 complaint, California State Water Resources Control Board (SWRCB) Division of Water Rights performed an investigation and found that meadow restoration projects utilizing the pond-and-plug technique did not result in a consumptive use of water in the restored meadows that would be significantly different from the consumptive use that existed prior to meadow and channel degradation (SWRCB 2011). SWRCB found that elimination of the artificial drainage of groundwater from the meadows (by plugging the incised channel) may make less water available to downstream users than was available when the channels were incised because the groundwater levels result in increased consumptive use of groundwater by meadow vegetation. However, SWRCB found that downstream water users do not have a right to expect more than the natural flow of the stream. SWRCB staff met with downstream water users and the Indian Creek Watermaster and found that the users were not able to document any actual injury to the users due to the restoration projects. SWRCB also stated that, in the long term, the increased groundwater levels occurring as a result of meadow restoration projects will likely benefit downstream water users.

Following restoration work, surface flows may increase or decrease, depending on climatic variables and response time of the meadow as it rehydrates. As described above for Issue 1, past projects indicate that decreases in late season flows may occur within or immediately downstream of meadow restoration projects, likely due to increased evapotranspiration resulting from the raised water table or due to beaver activity that spreads surface flow across the restored meadow floodplain. However, any change in late season flow due to the extensive partial channel fill treatment projects that have occurred on Red Clover Creek is not measurable at a point well upstream of the nearest agricultural diversion (Cawley 2011). As stated in the Purpose section of this document, a full water budget evaluation will be made regarding the proposed project. The Thompson Meadow Restoration and Water Budget Evaluation Project includes further investigation of late season flow of meadow restoration and will conduct a comprehensive pre- and post-project hydrologic analysis that includes 5 years of pre-project and 5 years post-project data collection. Given the much smaller size of the proposed Thompson Meadow Restoration Project (relative to past meadow projects on Red Clover Creek), and its relatively minor flow contribution to Red Clover Creek, it is expected that the evaluation project will confirm that effects to late season downstream flow available to downstream water rights holders, either positive or negative, are immeasurable and negligible.

Issue 6: Existing channel is stable and vegetated and doesn't need to be restored.

The Indian Valley commenters state that the existing Thompson Creek stream area is stable, with dense sedges covering the creek bottom and the banks continuously vegetated. The Need for Action and Desired Condition for the proposed project are described above in this EA/IS. Thompson Creek is deeply incised throughout much of the project reach, effectively eliminating its connection with the historical meadow floodplain and confining high energy flood flows within the incision. Stream banks are over-steepened due to this incision and flood scour, and are sparsely vegetated with non-riparian grasses and sage. The establishment of mature riparian vegetation communities along stream banks is prevented under the existing condition because vegetation that does develop within the incision is susceptible to erosion during large flood events. The channel bottom is indeed well covered by dense areas of stream flow resistant sedge, however small portions of this sedge were compromised when the flood flows of 2017 were confined within the incision near the upstream end of the project area, causing turbulent flow that overturned sedge mats. A photo taken in May 2017 depicts overturned sedge mats in the Thompson Creek channel (Figure 3). Additionally, a substantial headcut exists near the downstream end of the project reach which eroded measurably during the 2017 floods and which, in future floods, threatens to migrate further upstream and erode the sedge in the bottom of the stream throughout the project reach. Further, several existing headcuts where the tributaries on the west side of the meadow enter the incised main stem of Thompson Creek eroded substantially in the 2017 floods. Left untreated, these headcuts will likely cut further into the meadow and may potentially capture a larger proportion of future meadow flood flows.

Reconnection of Thompson Creek with its historical meadow floodplain would stablilize and reinvigorate vegetation along the channel and reduce flood flow stresses by spreading flows across the floodplain. The no-action alternative considers no treatment of the existing stream channel and is used in this document as a comparative baseline for the action alternatives.

Figure 3. **Scoured sedge mats within entrenched channel.** Looking downstream. May 2017. Latitude: 39.979240469°, Longitude: -120.478269647°

Chapter 4. Environmental Impacts of the Proposed Action and Alternatives

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

Affected environment and environmental consequences sections have been divided by resource areas and then by alternative. For each resource, there is a discussion of the potential environmental impacts associated with construction and maintenance of the proposed project. Potential direct and indirect impacts of the proposed project are analyzed in accordance with 40 CFR 1508.8. Direct impacts are caused by the action and occur at the same time and place. Indirect impacts are caused by the action but are later in time or farther removed in distance. The EA/IS analyzes the direct and indirect impacts for each resource, but does not specifically differentiate between direct and indirect for every resource. In addition, direct and indirect impacts are analyzed in association with other past, present, and probable/reasonably foreseeable future impacts (listed in Appendix C) under some resources and in Section 4.4 “Cumulative Impacts”. Primary management activities considered under cumulative impacts include vegetation management (timber harvest, fuels thinning, etc) and grazing management (season, numbers, and location of livestock use).

CEQA Guidelines Appendix G was used as the basis for assessing the significance of potential environmental impacts, taking into account the whole of the action as required by CEQA. Agency standards, regulatory requirements, and professional judgment were also used, where appropriate. For the purposes of NEPA, the context and intensity of the significance of potential project effects was taken into consideration.

Per CEQA guidelines, mitigation measures are provided to reduce potentially significant impacts to less-than-significant levels, where applicable. A summary of mitigation measures is included in Appendix A, “Mitigation Monitoring and Reporting Program”.

To verify that the effects analyses in this document are accurate, project performance measurements will be implemented as described in Appendix B, “Project Performance Monitoring Plan”.

The following resource specialist analyses for the proposed project are incorporated by reference:

- Biological Evaluation for Terrestrial and Aquatic Wildlife Species (USDA 2019a)
- Biological Assessment for: Sierra Nevada Yellow-legged Frog, Gray Wolf, Pacific Fisher (USDA 2019b)
- Project Management Indicator Species Report (USDA 2019c)
- Project Migratory Landbird Conservation Report (USDA 2019d)
- Biological Assessment/Evaluation of Rare and Sensitive Plant Species (USDA 2019e)
- Hydrology and Soils Report (USDA 2019f)
- Determination of National Register of Historic Places Eligibility and Finding of Effect for Two Pre-Contact Archaeological Sites (USDA 2018b).

4.1 Resources Eliminated from Further Analysis

As part of the scoping and environmental analysis conducted for the proposed project, several resources were eliminated from detailed analysis because no impacts from project implementation are anticipated. A description of the resources and an explanation for eliminating them from further analysis are provided in this section.

4.1.1. Aesthetics

The project area is in a natural setting surrounded by forest lands administered by the Plumas National Forest, Beckwourth Ranger District. The meadow is located over 20 miles from State Route 70 (SR 70), which is designated as a national scenic byway, but the meadow is not visible from SR 70 or any other major road or highway. The project area is accessed by a dead-end spur road off of Forest Service Road 25N05 and is not visible from any Forest Service road other than the unnamed spur road. The nearest developed campground, Crocker Campground off the Beckwourth-Genesee Road, is over ten miles from the project area. There are no developed recreational sites or routes (i.e. campgrounds and trails) with views of the project area.

The proposed project is designed to fulfill the management direction specified in the 1988 PNF LRMP (USDA 1988), as amended by the SNFPA FEIS (USDA 2003) and ROD (USDA 2004). The PNF LRMP management direction for Visual Resources calls for the USFS to maintain high visual quality on lands committed to other uses or readily apparent from recreational developments, major travel routes, and other high use areas. The proposed project encompasses one Management Area outlined in the PNF LRMP, the Dotta Management Area 36. General direction for this management area is in the PNF LRMP.

CEQA establishes that it is the policy of the State to take all action necessary to provide the people of the State “with…enjoyment of aesthetic, natural, scenic and historic environmental qualities” (CA Public Resources Code [PRC] Section 21001[b]).

The PNF Visual Management System (VMS) was developed to provide a process for the management of the scenic resources of the physical land and the activities that occur on it. The process involves inventory, analysis, and the determination of visual management objectives and provides for the input of these objectives into an integrated resources planning and decision making process (USDA 1988). The synthesis of this information is used to determine Visual Quality Objectives (VQOs) for managing PNF lands. VQO’s include Variety Classes of large areas of physical land features (Character Types). Three Variety Classes are identified and delineated within each Character Type, and Sensitivity Levels of the concerned public for scenic resources are combined to determine VQOs. As described above, the proposed project is located within the Dotta Management Area 36. There is one Visual Quality Objective (VQOs) outlined/mapped in the PNF LRMP within the Dotta Management Area associated with the SR 70 corridor:

- General Direction: Maintain pleasing visual corridors.
- Standards and Guidelines: Apply Rx-10 and Rx-14 to the SR 70 viewshed.

The proposed project would not occur along the SR 70 corridor and would therefore have no impact to the SR 70 viewshed. The proposed project would not degrade the existing visual character or quality of the area, nor create any new sources of light or glare. Disturbed areas within the project area may be bare of vegetation the first year following construction; however, the proposed project includes revegetation to accelerate the establishment of vegetation in these areas. Revegetation success would be monitored to ensure reestablishment of riparian and forest cover. Based on the factors discussed above, no impacts to aesthetics or visual quality are expected.

4.1.2 Agricultural and Forest Resources

Important farmland maps of areas within and surrounding the proposed project area do not identify any areas as important farmland (i.e. areas that include Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or properties in Williamson Act contract) (California Department of Conservation 2016). Implementation of the proposed project would not result in any impacts to important farmland.).

The Plumas County General Plan land use designation for the project area is Timber Resource Land (TRL) (Plumas County 2016). TRL allows for the harvesting and processing of forest products. Zoning and General Plan land use designations for the project area and surrounding areas include timber-related management areas. These areas allow for the cutting and processing of timber products. The proposed project would result in some tree removal due to excavation of fill material from the upland borrow sites. The tree removal associated with the upland borrow sites would not conflict with the existing zoning and would not impact the overall abundant timber resources in the surrounding area. Implementation of the proposed project would not conflict with timber designations or zones or a convert forest land to non-forest use, resulting in no impact.

4.1.3. Energy

The proposed project is a restoration and monitoring activity that would not create an additional long-term source of energy demand. There would be no unusual equipment operation that would result in energy consumption that is wasteful, inefficient, or unnecessary during project construction. Energy consumption would occur for a short duration during project construction through the operation of heavy equipment for grading and fill activities. All equipment would be provided through equipment contractors and rental fleets, which are required to meet California Air Resources Board (emissions) standards for diesel equipment. Further, each piece of equipment would have a dedicated function during construction—e.g., excavating, grading, placing rock, transplanting vegetation, or scarifying completed surfaces for seed planting. All equipment not required for a task would be turned off. Nor would, temporary construction-related energy consumption would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. Implementation of the proposed project would not result in an adverse impact with regard to energy resources.

4.1.4 Environmental Justice

The project area is in a rural, natural environment on public National Forest System lands. All considerations under Title VI of the Civil Rights Act of 1964 and related statutes have been incorporated throughout the development of the proposed project. Implementation of the proposed project would not result in adverse impacts to low income or minority populations.

4.1.5. Land Use and Planning

The proposed project area is located on public lands managed by the USFS which are used primarily for livestock grazing and dispersed recreation. Timber harvest and fuel reduction projects have and continue to take place adjacent to and in the vicinity of the meadow. The proposed project would not alter any existing land uses. Livestock grazing would be excluded from the restored meadow for up to three years to allow for vegetation recovery, but would continue outside of the restored areas of the meadow. Once vegetation is well established and the project area is stabilized, grazing would be allowed in the excluded area under management guidelines outlined by the USFS in an annual rotation letter to the permittee that would apply regardless of whether the proposed project is implemented. There are no other known plans for the project area. There is no established community in or near the project area. Implementation of the proposed project would not have an impact on land use and planning.

4.1.6. Mineral Resources

The Plumas County General Plan identifies prime mining resource production areas and advises that these locations can occur where surrounding land use and environmental setting will permit extraction without major adverse environmental impacts (Plumas County 2016). There are no identified mineral resource areas in or near the project area identified in the County's General Plan (Ibid). Mineral resources are not present in the project area; therefore, implementation of the proposed project would have no impact on mineral resources.

4.1.7. Paleontology

Geologic parent materials within the project area consist of granodiorite, quartz-diorite, andesite, and basic volcanic breccia, with a mixture of these parent materials in the meadow alluvium (USDA-PNF Soil Resource Inventory, 1988; USDA-NRCS WebSoil Survey, 2018). There is no potential for occurrence of significant paleontological resources in plutonic igneous rocks, such as granites and diorites (SVP 2010). Most volcanic rocks in the Sierras have become schist (Hill 2006) or high-grade metamorphic rocks, which also have no potential to contain paleontological resources (SVP 2010). Because the rock units within the project area are not fossiliferous, implementation of the proposed project would not have an impact on paleontological resources.

4.1.8. Population and Housing

The Plumas County population in 2018 was estimated at 18,804 (U.S. Census Bureau 2019). The project area is located on public lands managed by the USFS; consequently, there are no people or housing in the project area. The closest residential community, Beckwourth, is approximately 20 miles from the project area. The proposed project consists of restoring a mountain meadow and would not induce population growth or displace housing or people. Therefore, implementation of the proposed project would not have an impact on population and housing.

4.1.9. Public Services

There are no public service facilities within or near the project area. The proposed project would not affect public service ratios or response times and would not construct or result in the need to construct new public service facilities. The proposed project is a restoration project in a natural setting and implementation of the proposed project would not have an impact on public services.

4.1.10. Recreation

The project area is located on public National Forest system lands and is occasionally used for dispersed recreation such as camping, fishing, hunting, and off-highway vehicle (OHV) touring. The meadow is accessible via a spur road off of National Forest System Road 25N05 behind a closed, unlocked gate. The proposed project does not include recreational facilities, nor would it result in a need for such facilities. The project is not expected to increase recreational use of the area because the primary character of the site, open meadow, would not change. Therefore, implementation of the proposed project would not have an impact on recreation.

4.1.11. Transportation

The project area and surrounding area is occasionally used for dispersed recreation such as camping, fishing, hunting, and OHV touring. The meadow is accessible via a spur road off of National Forest System Road 25N05 behind a closed unlocked gate, which is not a primary route to any destination. This spur would be improved for construction access, including widening and drainage improvements. These road improvements would not create a road hazard or conflict with existing uses. The project would not affect the existing capacity of the transportation system near Thompson Meadow. The project would not change the nature of travel in the area, and therefore would not increase hazardous

conditions, nor affect emergency access. There are no alternative transportation plans that affect the project area because of its natural setting and low use. Therefore, implementation of the proposed project would not have an impact on transportation.

4.1.12. Utilities and Service Systems

The project area is within a natural setting with no existing utilities or service systems, and the construction of new service systems is not proposed. Sufficient water supplies would be available from the creek for dust control during the short-term construction period. The proposed project would not generate solid waste. Therefore, implementation of the proposed project would have no impact on utilities and service systems.

4.1.13. Wildfire

The proposed project is located within the Federal Fire Protection Responsibility area (FFRA) and is within a half mile of State Responsibility areas on privately owned lands near the project area. The project area and the surrounding Red Clover Valley is classified as a non-very high fire hazard severity zone (VHFHSZ) with upland forested areas designated as VHFHSZ. Much of the mapped VHFHSZ lands in the FFRA surrounding Thompson Meadow are planned for future fuel reduction under the landscape-scale Mapes Project proposed by the USFS. The proposed project is a restoration activity that would not result in land use changes that would affect an emergency response or evacuation plan. The project is not within VHFHSZ lands and is a meadow, and therefore is not an area of high slope or other factors that would exacerbate wildfire risks. The project would not require installation of infrastructure that would exacerbate fire risk and would not result in downstream flooding or landslide risk due to post-fire slope instability or drainage changes. The project would reconnect the stream channel to its floodplain in Thompson Meadow, allowing seasonal high flows to spread and recharge groundwater in the project area. Created pooled water within the project area could potentially provide water sources for wildfire suppression. Ponded water in downstream restored meadow channels have been used in the past for aerial fire suppression support. Based on these factors implementation of the proposed project would not have an impact with regard to wildfire risk.

4.2 Affected Environment, Environmental Consequences, and Avoidance, Minimization, and/or Mitigation Measures

4.2.1. Air Quality

Regulatory Setting

The Clean Air Act provides the principal framework for national, state and local efforts to protect air quality. Under the Clean Air Act, the Office of Air Quality Planning and Standards is responsible for setting standards for pollutants which are considered harmful to people and the environment. The 1990 Clean Air Act is the most recent version of a law first passed in 1970. The United States Environmental Protection Agency (USEPA) and California Air Resources Board (CARB) have established ambient air quality standards for six “criteria pollutants,” pursuant to the federal Clean Air Act of 1970 and the California Clean Air Act, respectively. The criteria pollutants are ozone, carbon monoxide, nitrogen dioxide, particulate matter less than 2.5 microns in aerodynamic diameter (PM2.5), particulate matter less than 10 microns in aerodynamic diameter (PM10), sulfur dioxide, and lead (United States Environmental Protection Agency 2016a). CARB oversees standards maintenance for three additional pollutants: hydrogen sulfide, sulfates, and visibility-reducing particles. The USEPA promulgated the General Conformity Rule on November 30, 1993 in Volume 58 of the Federal Register (58 FR 63214) to implement the conformity provision of Title I, section 176(c)(1) of the Clean Air Act (CAA). Section 176(c)(1) requires that the federal government not engage in, support, or provide financial assistance for licensing, permitting, or approving any activity not conforming to an approved CAA implementation

plan. The approved implementation plan could be a federal, state, or tribal Implementation Plan (i.e., FIP, SIP, or TIP). The General Conformity Rule is codified in Title 40 of the Code of Federal Regulations (CFR) Part 51, Subpart W and Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." The General Conformity Rule applies to all federal actions except highway and transit programs. The latter must comply with the conformity requirements for transportation plans in 40 CFR Part 93, Subpart A.

Affected Environment

The air quality of a region is determined by the climatological conditions, topography, and the types and amounts of pollutants. California is divided geographically into 15 air basins. An air basin generally has similar meteorological and geographic conditions. The proposed project is located in Plumas County, which is located in the Mountain Counties Air Basin (MCAB).

The MCAB covers the mountainous area of the central and northern Sierra Nevada Mountains. Elevations range from several hundred feet in the foothills, to over 10,000 feet along the Sierra crest. This air basin includes Plumas, Sierra, Nevada, Central Placer, West El Dorado, Amado, Calaveras, Tuolumne and Mariposa Counties.

In the MCAB, regional airflows are affected by the mountains and hills, which direct surface airflows, causing shallow vertical mixing, and create areas of high pollutant concentrations by hindering dispersion. Inversion layers, where warm air overlays cooler air, frequently occur and trap pollutants close to the ground. In the winter, these conditions can lead to carbon monoxide (CO) "hotspots" along heavily traveled roads and at busy intersections. During summer's longer daylight hours, stagnant air, high temperatures, and plentiful sunshine provide the conditions and energy for the photochemical reaction between reactive organic gases (ROGs) and nitrogen oxides (NOx) that results in the formation of ozone (O3). Because of its long formation time, ozone is a regional pollutant rather than a local hotspot problem. In the summer, the strong upwind valley air flowing into the basin from the Central Valley to the west is an effective transport medium for ozone precursors and ozone generated in the Bay Area and the Sacramento and San Joaquin valleys. These transported pollutants predominate as the cause of ozone in the MCAB and are largely responsible for the exceedances of the state and federal ozone ambient air quality standards in the MCAB (Caltrans 2016d).

The County's largest sources of Particulate Matter are unpaved road dust, prescribed burning, and residential fuel. Primary activities contributing to these pollutant emissions include wildfires, use of woodstoves, forestry management burns, residential open burning, vehicle traffic, and windblown dust. The varying topography of the air basin also contributes to localized air quality issues within valley areas (Caltrans 2016d). Plumas County is classified as attainment1 for all National Ambient Air Quality Standards (NAAQS): O3, particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), CO, nitrogen dioxide (NO2), and sulfur dioxide (SO2). Plumas County is classified as nonattainment2 for the PM10 California Ambient Air Quality Standards (CAAQS).

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

The proposed project would have no long-term effects on air quality. However, the proposed project includes excavation and grading activities to fill the incised channel in Thompson Meadow. Construction activities may create short-term degradation to air quality due to the release of

[1] Status assigned to areas where monitored pollutant concentrations did not violate national and/or State ambient air-quality standards in the last three years.
[2] Status assigned to areas where monitored pollutant concentrations violated national and/or State ambient air-quality standards within the last three years.

particulate emissions (airborne dust) generated by excavation, filling, hauling, and other construction activities. Emissions from heavy construction equipment are also expected and would include CO, NOx, volatile organic compounds (VOCs), PM10, and PM2.5, and toxic air contaminants such as diesel exhaust particulate matter. Estimates of equipment and usage were analyzed for greenhouse gas emissions (refer to "Greenhouse Gas Emissions" section).

The proposed project construction involves cut-and-fill activities, improving road access, and removal and replanting of vegetation with heavy equipment. Engine emissions associated with the excavation, handling, and transport of soil and rock materials to and from the site would have the greatest effect on air quality. These actions could temporarily generate levels of PM10, PM2.5, and small amounts of CO, SO2, NOx, and VOCs that would be of concern. These emissions would be temporary and limited to the immediate area surrounding the construction site, and minimized with implementation of BMPs for the reduction of exhaust emissions. Sources of fugitive dust would include disturbed soils at the construction site and trucks carrying uncovered loads of rock. PM10 is the pollutant of greatest concern associated with dust. PM10 emissions would depend on soil moisture, silt content of soil, wind speed, and the amount of equipment operating. Larger dust particles would settle near the source, while fine particles would be dispersed over greater distances from the construction site. Without proper control measures dust generated from construction activities could have an adverse effect on air quality. With implementation of USFS and DWR project design criteria, fugitive dust and exhaust emissions from construction activities would not result in any adverse air quality impacts.

Plumas County is in attainment for all current NAAQS. Therefore, conformity requirements do not apply. Implementation of USFS and DWR project design criteria would reduce fugitive dust and exhaust emissions during construction and avoid adverse air quality impacts.

CEQA Considerations

Construction activities would be localized and short-term in duration. Due to the project's remote location, it would not expose any sensitive receptors to substantial pollutant concentrations, nor result in air pollutant standard violations, or conflict with any regional or local air quality plan. Construction emissions would not violate CAAQS and would be less than significant with the implementation of the following BMPs to minimize exhaust emissions:

- All construction equipment shall be maintained in proper tune according to manufacturer's specifications.
- To the extent feasible, the use of diesel construction equipment meeting current CARB certification standards for off-road heavy-duty diesel engines shall be maximized.
- Unnecessary vehicle idling shall be restricted to 5 minutes or less.
- All off-road heavy-duty diesel equipment greater than 50 horsepower used in execution of the Project shall be registered with the Air Resources Board's Diesel Off-Road Online Reporting System (DOORS) and meet all applicable standards for replacement and/or retrofit.
- All portable equipment used in the execution of Project construction, including generators and air compressors rated over 50 brake horsepower, shall be registered in the Portable Equipment Registration Program.

Impacts would be further reduced with implementation of the USFS and DWR project design criteria that includes watering roads and construction disturbance areas to minimize and control dust.

Alternative B – No Action

Under the no action alternative no adverse effects to air quality from construction would occur and CO, SO2, NOx, VOCs, PM10, and PM2.5 levels/emissions within the surrounding area would remain unchanged.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with the PNF LRMP and adheres to federal requirements for air quality management.

4.2.2. Biological Resources – Threatened and Endangered Animal Species

Regulatory Setting

The Federal Endangered Species Act (FESA): 16 United States Code (USC) Section 1531, et seq. (see also 50 Code of Federal Regulations (CFR) Part 402) and later amendments provide for the conservation of endangered and threatened species and the ecosystems upon which they depend. Under Section 7 of this act, federal agencies are required to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS) to ensure that they are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat is defined as geographic locations critical to the existence of a threatened or endangered species. The outcome of consultation under Section 7 may include a Biological Opinion with an Incidental Take statement, a Letter of Concurrence and/or documentation of a No Effect finding. Section 3 of FESA defines take as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or any attempt at such conduct."

Similarly, the California Endangered Species Act (CESA), California Fish and Game Code Section 2050, et seq. emphasizes early consultation to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate planning to offset project-caused losses of listed species populations and their essential habitats. CDFW is the agency responsible for implementing CESA. Section 2081 of the Fish and Game Code prohibits "take" of any species determined to be an endangered species or a threatened species. Take is defined in Section 86 of the Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." CESA allows for take incidental to otherwise lawful development projects; for these actions an incidental take permit is issued by CDFW. For species listed under both the FESA and CESA that require a Biological Opinion under Section 7 of the FESA, CDFW may also authorize impacts to CESA species by issuing a Consistency Determination under Section 2080.1 of the California Fish and Game Code.

The USFS submitted an initiation package for informal consultation under FESA, prepared in accordance with legal requirements set forth under regulations implementing Section 7 of the FESA (50 CFR 402; 16 U.S.C. 1536 (c)), on March 22, 2019. The initiation package consisted of a Biological Assessment (BA) for Sierra Nevada Yellow-legged Frog (*Rana sierrae,* SNYLF) (federal endangered, State threatened), Gray Wolf (*Canis lupus*) (federal and State endangered), and Pacific Fisher (*Pekania pennant*) (proposed federal threatened, no CESA listing) (USDA 2019b). The informal consultation initiation package requested concurrence that the proposed project may affect, but is not likely to adversely affect, SNYLF and gray wolf. Conference on Pacific fisher was not requested.

Affected Environment

The proposed project was entered into the USFWS Information for Planning and Consultation (IPaC) website on November 14, 2018 (Consultation Code: 08ESMF00-2019-SLI-0338). A total of two federally threatened, endangered, or candidate species were identified in the IPaC query that may occur within

the proposed project boundary and/or may be affected by the proposed project (USDA 2019b). There was no identified Designated or Proposed Critical Habitat for any species within the proposed project boundary and/or that would be affected by the proposed project (Ibid). The two species identified by IPaC were SNYLF and delta smelt (*Hypomesus transpacificus*). Delta smelt was eliminated from analysis due to the lack of species distribution, suitable habitat, and lack of designated critical habitat.

As described in the regulatory section, a BA for SNYLF, Gray Wolf, and Pacific Fisher (USDA 2019b) was prepared in accordance with FESA and CESA regulations.

Numerous sightings of the mountain yellow-legged frog are known from some of the tributaries of Antelope Lake including Boulder Creek, Lowe Flat, and Lone Rock Valley areas approximately 20 air miles northwest of the project area. In addition, a historic sighting of this species was recorded in Last Chance Creek approximately 15 air miles to the northeast. There are no historical records of SNYLF occurring within the project area, and none were observed during surveys. Suitable habitat in and adjacent to the project area is marginal for this species.

There is one known wolf pack, the Lassen Pack, utilizing a broad area of western Lassen and northernmost Plumas counties. The Lassen Pack's activity, as of October 2017, was less than 25 air miles from the project area. To date, game cameras deployed in the project area have not captured photos of any wolves but have documented the presence of the wolf's prey species in the project area.

No known fisher population exists in the proposed project area or surrounding area. However, upland habitat surrounding Thompson Meadow has the potential to support a resident fisher population if this species were to colonize the area.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

The USFWS issued a letter of concurrence with the USFS determination on May 9, 2019. The USFWS concluded the proposed project may affect, but is not likely to adversely affect, the gray wolf or SNYLF because "the proposed activities are not expected to result in adverse effects to the gray wolf due the implementation of conservation measures that minimize disturbance to wolves from human activities during the vulnerable periods of denning and early pup rearing. Further, site specific surveys resulted in no SNYLF observations. The surveys detected the presence of aquatic predators (crayfish and trout), further reducing the potential for SNYLF to occur within the project area" (USDI 2019).

Although informal consultation on the Pacific fisher was not requested, the BA evaluated the proposed project effects on fisher. Potential direct effects to fisher from excavation activities within the identified upland borrow sites consist of modification or loss of habitat or habitat components. Upland borrow material removal would occur on less than one percent of available potential suitable fisher habitat in the project vicinity. Activities would not result in the loss of suitable habitat; however they would reduce habitat quality. Effects to habitat would be reduction of moderate (40-59%) to dense (60-100%) canopy cover in small tree (11-24 inch diameter at breast height [DBH]) habitat. Vegetation removal, including removal of trees, would be kept to the minimum amount necessary to obtain the required amount of fill material for the meadow restoration. Disturbance of mesocarnivore habitat components, such as snags and downed logs, would be avoided to the extent possible. An average of three snags and three large down logs per acre with DBH greater than 15 inches would be retained per Forest Plan guidelines. Disturbance of habitat would not occur on 99% of potential habitat in the proposed project and surrounding area, which would allow opportunities for future dispersal, foraging, and denning within the project vicinity if the species were to re-colonize. Strongly associated with moderate to dense forested habitats, fishers avoid non-forested habitats, such as grasslands and wetland habitats, with little or no cover (USFWS 2016). Restoration activities in the meadow proper would therefore have no direct or indirect effects on the fisher.

Due to the lack of species presence in the proposed project area and surrounding area, there would be no direct or indirect effects of disturbance due to noise and increased human presence during project construction activities. Up to three acres of low quality potential suitable habitat would be degraded. If a fisher den were to be detected prior to or during project work, appropriate LOPs would be implemented to protect denning.

The existing forested habitat conditions are a reflection of all past activities that have occurred within the proposed project and surrounding area. Ongoing Forest-wide activities and programs that cumulatively contribute to effects on fisher habitat in the project vicinity include woodcutting, Christmas tree cutting, and recreational use. Ongoing project monitoring would occur for 5 years after implementation. The proposed project area also overlaps with the planning area for the Mapes Project.

The woodcutting and Christmas tree cutting programs on Plumas National Forest are ongoing, have been in existence for years, and are expected to continue into the future. The past and future effect of the woodcutting program has been and would be reducing the number of snags in all forest types, along roadsides throughout much of the area surrounding the proposed project site.

Open roads and improperly closed roads adversely affect mesocarnivores by fragmenting suitable habitat and increasing the opportunity for human intrusion and habitat manipulation (e.g., woodcutting). The existing road density estimate (1.68 miles of road per square mile) in the surrounding area is within the range (1-2 miles/square mile) of road density estimates that will still provide moderate habitat capability for Sierra marten (Freel 1991). Models indicate that open road densities should be less for Pacific fisher. No changes to road density would occur as part of the Thompson Meadow Project. As such, the area would remain within suitable road density condition levels for mesocarnivores like marten and fisher.

Most of the recreation use within the proposed project and surrounding area consists of dispersed camping, hiking, horseback riding, hunting, mountain biking, OHV use, pleasure driving, and wildlife watching. Such use is expected to continue at the existing rate. These activities would have no effect on mid-seral habitat, which provides potential suitable denning and foraging habitat in the proposed project area.

Thinning and prescribed burning treatments proposed in the Mapes Project would have an overall indirect negative impact to the suitability of fisher habitat; however, the expectation is that the short- and long-term benefits of fuel reduction would outweigh the short-term negative impacts of forest thinning and prescribed burning by reducing the risk of habitat loss due to a devastating wildfire. Any projects capable of producing adverse effects to this species, including the Mapes Project, have been, or will be, submitted for conferencing to USFWS.

Due to the combination of lack of species presence and the anticipated lack of direct effects to fishers, cumulative effects to this species are not expected. However, there is still a small chance for unanticipated effects to occur to fisher habitat and the ability for the proposed project area to sustain a population in the future if it were to re-colonize the area. In summary, the Thompson Meadow project May Affect, but is Not Likely to Jeopardize, the continued existence of Pacific fisher.

CEQA Considerations

The SNYLF and gray wolf, both State-listed species, have the potential to occur within the proposed project boundary and/or be affected by the proposed project. The Pacific fisher is not likely to occur in the project area under existing conditions. Informal consultation and concurrence determination by the USFWS determined the proposed project would not have an adverse impact on CESA- or FESA-listed species with the implementation of conservation measures outlined in the BA. Therefore, impacts to the SNYLF, gray wolf, and Pacific fisher would be less than significant, and would be further reduced by obtaining and adhering to all conditions and requirements of appropriate regulatory permits, use of

best management practices, and implementation of the avoidance, minimization, and/or mitigation measures identified below.

Avoidance, Minimization and/or Mitigation Measures

- Construction activities would occur during the dry time of the year when stream flow in Thompson Creek is at its lowest, and reproductive cycles for most aquatic species have reached the dispersal stage, from mid-August through mid-November.
- Amphibian surveys for Sierra Nevada yellow-legged frog would be conducted between June and August in the project area and 0.25 mile upstream and downstream of the project area prior to project implementation by a Forest Service approved biologist. Should any Sierra Nevada yellow-legged frogs be located before or during implementation, the USFWS would be notified and consulted. Project operations would cease and additional protective measures would be taken before re-convening any project activities.
- One month prior to commencement of construction activities, CDFW and the USFWS would be notified to determine if there is gray wolf activity near the Project area.
- If an active wolf den or rendezvous site is located within 1 mile of the Project area prior to or during project activities, a limited operation period (LOP) restricting all noise or smoke generating activities shall be instated from April 1 through July 15. Coordination would continue with CDFW and the USFWS to determine any LOP modifications.
- If fisher were detected prior to or during project work, appropriate LOPs would be implemented to protect denning.
- Should any threatened, endangered, or candidate species be located during project activities, a Forest Service approved biologist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.

Alternative B – No Action

Under the no action alternative no adverse effects to FESA- or CESA-listed species and/or their habitats would occur.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with FESA and CESA requirements.

4.2.3. Biological Resources – Special-Status Animal Species

Regulatory Setting

Many State and federal laws regulate impacts to wildlife. The USFWS, NMFS, and CDFW are responsible for implementing these laws. Animals are considered to be of special concern based on (1) federal, State, or local laws regulating their development; (2) limited distributions; and/or (3) the habitat requirements of special-status animals occurring on site. This section discusses potential impacts and permit requirements associated with animals not listed or proposed for listing under FESA or CESA. Species listed or proposed for listing as threatened or endangered are analyzed in the Threatened and Endangered Species Section above. All other special-status animal species are analyzed within this section, including CDFW fully protected species, CDFW species of special concern, USFS Management Indicator Species (MIS), and USFS sensitive species. The previous section identified the State and federal websites that were utilized to determine the potential occurrence of listed threatened and endangered animals within the proposed project. The following sources were used to generate maps

and lists of all sensitive biological resources that may occur or are known to occur in the proposed project area:

- USFWS IPaC website query on November 14, 2018
- CDFW Biogeographic Information and Observation System website queries (9 Quad Search, Crocker Mtn Quad, and Plumas County) on October 24, 2017
- California Natural Diversity Database (CNDDB) query on February 16, 2016 and Oct 25, 2017
- Forest Service Sensitive Species list for Plumas National Forest
- Other TES species with habitat in Plumas County and/or Plumas National Forest

On November 6, 2017, the Proposed Action was sent to CDFW. No wildlife issues were raised, and no correspondence has occurred since with regard to the proposed project. A Biological Evaluation (BE) was completed on March 14, 2019 (USDA 2019a), a Management Indicator Species Report was completed on March 7, 2019 (USDA 2019c), and a Migratory Landbird Conservation Report was completed on March 8, 2019 (USDA 2019d). Field surveys were conducted by DWR biologists from May 2006 through October 2007 to assess small mammal abundance, ground cover composition, bird species density and diversity, waterfowl use and production, deer use, and fish, reptile, and amphibian presence (DWR 2019). Amphibian surveys were conducted by Plumas Corporation staff in May and August of 2017. USFS deployed acoustic survey sensors to detect presence of bat species in 2017 and wildlife cameras to document presence of large mammal species in 2018.

Affected Environment

Management Indicator Species (MIS)

Project-level effects on MIS habitat are analyzed and disclosed as part of environmental analysis under NEPA. This analysis involves examining the impacts of the proposed project on MIS habitat by discussing how direct, indirect, and cumulative effects would change the habitat in the analysis area. MIS are identified in the Plumas National Forest (PNF) Land and Resource Management Plan (LRMP) (USDA 1988) as amended by the Sierra Nevada Forests Management Indicator Species Amendment (SNF MIS Amendment) Record of Decision (ROD)(USDA 2007). MIS are animal species identified in the SNF MIS Amendment ROD signed December 14, 2007. This ROD directs Forest Service resource managers to (1) at project scale, analyze the effects of proposed projects on the habitat of each MIS affected by such projects, and (2) at the bioregional scale, monitor populations and/or habitat trends of MIS. A project-specific MIS report analyzing the effects of the proposed project on the habitat of four MIS was completed in March 2019. The riverine and lacustrine, montane riparian, wet meadow, and early and mid seral coniferous forest habitat types that support aquatic macroinvertebrates, yellow warbler, Pacific tree frog, and mountain quail MIS, respectively, are described below. More detail on MIS selection and habitats are provided in the referenced project-specific MIS report (USDA 2019c).

Riverine and Lacustrine Habitat (Aquatic Macroinvertebrates)

Aquatic macroinvertebrates were selected as the MIS for riverine and lacustrine habitat in the Sierra Nevada. Within the proposed project area approximately 12.74 acres of riverine stream channels provide habitat for aquatic macroinvertebrates. Stream channel habitat includes riverine perennial (Thompson Creek), and both riverine intermittent and ephemeral habitat (unnamed tributary channels). Riverine channel elevations within the proposed project area have degraded to an average of 4-10 feet below the elevation of the meadow. The degraded elevation has resulted in progressively less frequent flood water spillage onto the meadow, resulting in increased channel erosion due to high stream flows being concentrated within the entrenched channel. The existing condition of excessive channel erosion from entrenchment widening and deepening during high flow events has resulted in riverine habitat with excessive sedimentation and decreased bank vegetation.

There is no existing lacustrine habitat within the proposed project area. Immediately upstream of the project area is a headcut treatment implemented by the USFS on Thompson Creek that has created

ponded water habitat. Although lacustrine habitat probably did not occur naturally in Thompson and Red Clover Valleys, beaver create ponds that mimic lacustrine habitat. There are no known visible signs of beaver dams in Thompson Creek within the proposed project area; however, beaver are known to exist in downstream Red Clover Valley. The pooled water created by the headcut treatment is very similar to a beaver-created pond. Observation of chewed willow upstream of the proposed project area in the vicinity of the headcut treatment indicates possible past occurrence of beaver; however, beaver-created lacustrine habitat does not exist in the proposed project area.

Montane Riparian Habitat (Yellow Warbler)

Yellow warbler (*Setophaga petechia*) was selected as the MIS for montane riparian habitat in the Sierra Nevada and is also considered under special-status animals below. In the existing degraded condition, riparian vegetation is herbaceous with little to no riparian shrub cover. The montane riparian habitat within the proposed project area is less than 1% of the length of the gully, due to poor condition and early seral stage of riparian vegetation (2-3 small willows scattered within the gully along the entire 0.68 mile reach of channel), resulting in less than a tenth of an acre of montane riparian habitat; therefore, this habitat type is considered non-existent within the project site. There is a small amount of montane riparian habitat with mature willow confined to the gully upstream of the proposed project area, and downstream on Red Clover Creek.

Wet Meadow Habitat (Pacific Tree Frog)

The Pacific tree (chorus) frog (*Pseudacris regilla*) was selected as the MIS for wet meadow habitat in the Sierra Nevada. The proposed project area provides approximately 9.59 acres of wet meadow habitat for chorus frogs. Wet meadows are a function of channel/floodplain hydrology and soil types. The meadow within the proposed project area was historically much wetter before channel degradation. The existing condition of one or more entrenchments throughout the floodplain meadow of the project area has greatly altered the channel/floodplain hydrology, resulting in drier meadow conditions. Entrenched channels in the proposed project area dry out the meadow by creating a drain at a lower elevation (creating more drainage pressure). Subsurface water can be seen draining out of open gully banks in early summer, thus contributing to stream flow early in the season, with little to none left for late season flow contribution or the maintenance of wet meadow habitat.

Early and Mid Seral Coniferous Forest (Mountain Quail)

Mountain quail (*Oreortyx pictus*) was selected as the MIS for early and mid seral coniferous forest habitat in the Sierra Nevada. Forested habitat in the upland surrounding Thompson Valley is eastside pine dominated by Jeffrey pine. Canopy closures are estimated at <60% with average DBH of 10 to 12 inches. Forested habitat is interspersed with small openings of sagebrush, rocky outcrops, and dry barren slopes. There are approximately 13.64 acres of early and mid seral coniferous forest habitat within the proposed project area.

Special-Status Animals

Based on database queries, seven individual special-status wildlife species; one special-status invertebrate, fish, and amphibian species each; and eight special-status bird species have the potential to occur within the proposed project and/or have suitable habitat within or adjacent to the proposed project boundary. An evaluation of each special-status species' potential for occurrence within the proposed project area determined the proposed project area provides suitable habitat for 21 species that have at least a moderate potential for occurrence. Three of these species were addressed under the threatened and endangered species section above. Further discussion of the remaining 18 species is provided below.

Western Bumble Bee

The Western bumble bee (*Bombs occidentalis*) is a USFS sensitive species. The western bumble bee occurs in California and all adjacent states, but is experiencing severe declines in distribution and

abundance due to a variety of factors including spread of pests and diseases by the commercial bumble bee industry, other pests and diseases, habitat destruction or alteration, pesticides, invasive species, natural pest or predator population cycles, and climate change. The habitat for this species is described as open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows (Williams et al 2014). Western bumble bees, like most other species of bumble bees, typically nest underground in abandoned rodent burrows or other cavities (Hobbs 1968, MacFarlane et al 1994, Plath 1922, Thorp et al 1983). Invertebrate surveys for bees have not been conducted within the proposed project area. However, suitable habitat does occur within the proposed project area and presence is assumed.

Mountain Sucker

The mountain sucker (*Catostomus platyrhynchus*) is a California Species of Special Concern (SSC). This species is found throughout much of western North America and is thought to have been introduced into the North Fork of the Feather River, likely as a result of a water diversion from the Little Truckee River for irrigation (Moyle 2002). Mountain suckers are commonly found in small headwater streams, primarily occurring in lotic waters from small mountain streams to large rivers (Belica and Nibbelink 2006), as well as in lentic environments where they have been documented utilizing impoundments on headwater streams in California (Belica and Nibbelink 2006, Decker and Erman 1992, Wydoski and Wydoski 2002). They are most common in low gradient streams with a mix of riffles, pools, and runs, with a wide range of substrates from clay, mud, and sand, through gravel and cobble, up to boulders (Smith 1966, Hauser 1969, Decker 1989). Water quality conditions for mountain sucker ranges from clear to easily roiled or turbid (Smith 1966). Spawning occurs during late spring to early summer, when water temperatures range between 51-66°F. They move into smaller streams, where they spawn over gravel riffles upstream from quiet pools. Threats to mountain suckers are generally caused by human activities that destroy, degrade, or fragment habitat. Habitat loss due to stream impoundment, degradation from sedimentation, and fragmentation from construction of passage barriers such as culverts, have all contributed to observed declines in sucker populations (Belica and Nibbelink 2006). Other threats include predation and competition from introduced non-native fishes, and hybridization with other suckers. During 2006 fish surveys in Thompson Creek, DWR detected the presence of mountain suckers within the proposed project area.

Southern Long-toed Salamander

The southern long-toed salamander (*Ambystoma macrodactylum sigillatum*) is another California SSC found from the central Sierra Nevada Mountains north, and east of the Cascades in Modoc and Lassen Counties. Adults are subterranean during most of the year, utilizing mammal burrows, rock fissures, and occasionally human-made structures. Breeding occurs mostly in temporary ponds created by winter and spring rains and snowmelt. In montane situations, salamanders emerge and migrate to breeding ponds as soon as springtime temperatures are warm enough to reduce snow cover and open ponds. Most surface movements such as migration to and from breeding ponds, and the dispersal of juveniles away from ponds, are associated with sustained rainfall, especially at night. Primary threats to the long-toed salamander are introduced predatory trout. Long-toed salamanders were not observed during amphibian surveys conducted in 2017, but suitable habitat does exist within the proposed project area and presence is assumed.

Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*) are a State endangered, fully protected species by CDFW and a USFS sensitive species. Bald eagles nest in forested areas adjacent to large bodies of water with abundant fish. Nests are typically in large conifers that protrude above the forest canopy to provide good accessibility and visibility. In California, bald eagles are not known to nest further than two miles from an open water body (Lehman 1979, USFWS 1986). The closest territory is located at Lake Davis, 4 air miles west of the proposed project area. There is no large open water body within the proposed project area suitable for eagle occupancy, thus nesting habitat does not exist within the proposed

project area. Nesting eagles have never been observed within the proposed project area; however, foraging adults and sub-adult bald eagles have been observed 0.5 miles downstream in a similar meadow restoration project implemented in 2006 on private land. Habitat suitability for nesting and foraging within the restored projects downstream is marginal in comparison to habitat available around Lake Davis.

Greater Sandhill Crane

Greater sandhill cranes (*Gris canadensis tabida*) are a State threatened, fully protected species by CDFW, and a USFS sensitive species. This species breeds in open wetland habitats surrounded by shrubs or trees, with nests found in marshes, bogs, wet meadows, prairies, burned-over aspen stands, and other moist habitats, preferring those with standing water. Greater sandhill cranes are an annual visitor to the Red Clover Creek watershed where they are generally seen during the spring and fall migrations. These valleys are generally used as stopover sites for rest and foraging. The proposed project area does not provide suitable nesting habitat due to the lack of tall wetland cover. No greater sandhill cranes or potential nesting habitat were observed during the 2006 avian surveys conducted by DWR.

Long-eared and Short-eared Owls

The long-eared owl (*Asio otus*) and short-eared owl (*Asio flammeus*) are both California SSC. Long-eared owls breed in dense coniferous or broadleaved woodlands with adjacent open areas where they hunt. In some areas, nests are found in coniferous or deciduous forests near open meadows. Long-eared owls roost in dense vegetation, often in conifers or willows, and forage in open grasslands, shrublands, or open coniferous and deciduous woodlands. Riparian habitat is required. Observations of long-eared owls have been documented in the Red Clover Watershed less than a mile southwest of the proposed project area and around Lake Davis, approximately four air miles from the project area. The proposed project area provides marginal nesting habitat due to the lack of dense woodlands but does provide suitable foraging habitat.

Short-eared owls are found in open habitats such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands. They nest and roost on the ground in dense vegetation and use elevated sites for perches, such as fence posts and mounds. Short-eared owls require large uninterrupted tracts of open grasslands and appear to be particularly sensitive to habitat loss and fragmentation. Primary threats are loss of habitat due to agriculture, livestock grazing, recreation, and development. Short-eared owls have been detected downstream in Red Clover Valley. Suitable habitat for this species does occur in the proposed project area. Neither long-eared nor short-eared owls were incidentally detected during the 2006 diurnal avian surveys conducted by DWR.

Northern Goshawk

Northern goshawk (*Accipter gentilis*) is a California SSC and a USFS sensitive species. This species prefers mature dense coniferous and deciduous forests with minimal understory, which are conducive for hunting conditions. Snags and dead-topped trees are utilized for observation and prey-plucking perches. Breeding activity generally occurs between April and July. Nests are often found in the tallest tree in a given stand on north-facing slopes, and are usually placed near openings and water. Surveys conducted by the USFS in 2001 detected a possible sighting and sign (feather) of goshawk within the proposed project area. Avian surveys conducted by DWR in 2006 and 2007 documented a goshawk within the proposed project area as well. Due to the openness of the forested habitat in the Thompson Creek watershed (average <60%), nesting habitat for goshawks within and surrounding the proposed project area is considered marginal; however, the open forested stands and meadow provide optimal foraging habitat.

Northern Harrier

The northern harrier (*Circus cyaneus*) is a California SSC. Harriers inhabit annual grassland up to lodgepole pine and alpine meadow habitats, as high 10,000 feet in elevation. Seldom found in forested habitat, harriers nest on the ground in shrubby vegetation, generally in emergent wetlands or along rivers or lakes; however, they may nest in grasslands, grain fields, or on sagebrush flats several miles from water. Primary threats are habitat loss due to draining of wetlands, land development for large-scale agriculture, and reforestation of old farmland and meadows. Prey abundance has been reduced due to overgrazing, pesticides, and reduced shrub cover from agricultural crop expansion. Because they eat small mammals, northern harriers are also susceptible to the effects of pesticide buildup as well as direct effects from eating poisoned animals. Northern harriers have been regularly observed within the proposed project area and were detected during the 2006-2007 avian surveys conducted by DWR.

Swainson's Hawk

Swainson's hawk (*Buteo swainsoni*) is a State threatened species. Typical habitat consists of open desert, grassland, or cropland for foraging near scattered large trees or small groves for nesting. Nests are typically found near water, but also nests in arid regions. Current threats to the species are due to a loss of prey and nesting sites. There were detections of Swainson's hawk in 2010-2013 and 2015 by Point Blue within previously implemented meadow restoration projects in Red Clover Valley. Swainson's hawks were observed in Red Clover Valley by USFS biologists in 2017 as well. Swainson's hawks were not observed during the 2006 avian surveys conducted by DWR, but suitable habitat for this species does occur within the proposed project area.

Yellow Warbler

The yellow warbler (*Setophaga petechia*) is a California SSC and USFS MIS. A migrant and summer resident in California, yellow warblers generally occupy riparian vegetation in close proximity to water along streams and in wet meadows (Lowther et al. 1999). They have also been known to utilize xeric montane brush fields, and occasionally the shrubby understory of mixed conifer forests. Threats to this species include degradation and loss of deciduous riparian habitat, nest parasitism by brown-headed cowbirds, and nest predation by squirrels, jays, and cowbirds. Grazing along creeks with willow stands can degrade yellow warbler nesting habitat. Yellow warblers were detected during the 2006-2007 avian surveys conducted by DWR, and have been detected in meadow restoration project areas in Red Clover Valley downstream from the proposed project area.

American Badger

American badgers (*Taxidea taxus*) are a California SSC, and are most abundant in drier open stages of most shrub, forest, and herbaceous habitats with friable soils. Suitable habitat is characterized by herbaceous, shrub, and open stages of most habitats with dry, crumbly soils. Badgers dig burrows in friable soil for cover and frequently reuse old burrows. Reproduction occurs in summer and early fall, with young mostly born in March and April. Highly specialized fossorial mustelids that help control small mammal populations, the primary threat to badgers is from indiscriminate predator control using indiscriminate trapping and persistent poisons causing extensive losses. Sightings of badgers in the proposed project area have been documented on USFS game cameras deployed around the project site, as well as incidental observations of badger holes within the surrounding area by DWR and Plumas Corporation staff. Potential suitable habitat exists in the drier perimeter edges of the meadow dominated by sagebrush and in the surrounding open coniferous forest stands.

Western White-tailed Jackrabbit

The western white-tailed jackrabbit (*Lepus townsendii townsendii*) is a California SSC. An uncommon to rare year-round resident of the crest and upper eastern slope of the Sierra Nevada, this species was once widespread throughout this range. Preferred habitats are open areas with scattered shrubs in sagebrush, subalpine conifer, juniper, alpine dwarf-shrub, and perennial grassland; however, they also

use low sagebrush, wet meadow, and early successional stages of various conifer habitats. Like other hares, this species takes cover and bears young in a shallow depression (form), usually in shrubby underbrush. There is little information regarding population status in California, but evidence points to a serious decline. Overgrazing by livestock has been cited as a principal factor (Dalquest 1948), as well as cultivation and other development. Surveys for western white-tailed jackrabbits have not been conducted within the proposed project area. To date, there are no known records of western white-tailed jackrabbits in the proposed project area, but suitable habitat is present.

Bats - Fringed Myotis, Pallid, Spotted, Townsend's Big-eared, and Western Red

Five special-status bat species are either present and/or have suitable habitat within the proposed project area. These species include: fringed myotis (*Myotis thysanodes*) – USFS sensitive; pallid bat (*Antrozous pallidus*) – California SSC and USFS sensitive; spotted bat (*Euderma maculatum*) – California SSC; Townsend's big-eared bat (*Corynorhinus townsendii*) - California SSC and USFS sensitive; and western red bat (*Lasiurus blossevillii*) – California SSC. Nearly 40% of all bat species in North America are included on some special-status list (Western Bat Working Group 2018). In general, the long-term persistence of North American bat species is threatened by the loss of clean, open water; modification or destruction of roosting and foraging habitat; and, for hibernating species, disturbance or destruction of hibernacula. Particularly, vandalism and repeated disturbance in roosting caves are primary causes for many species declines. Chemicals in the environment that affect bats or their prey are also a threat. Because of low fecundity, high juvenile mortality, and long generational turnover, many bat populations may be vulnerable to human-induced pressures. The proposed project area was surveyed by the USFS for individual bat species with Peterson acoustic detectors for three weeks in July 2017 and again for two weeks in August 2017. The acoustic detectors were located in the rocky outcrop on the southeast side of the creek, across from the proposed access road into the project area, and just upstream of the first proposed borrow site (pond) in the meadow. Acoustic sampling positively identified the presence of 13 bat species. Species identified included three special-status bat species: six detections of pallid bat, four detections of western red bat, and two detections of fringed myotis. No detections of spotted bats or Townsend's big-eared bats were recorded. Although the proposed project area was not searched for potential diurnal or nocturnal roosts, based on numerous older surveys conducted on PNF and bat detections within the proposed project area, as well as the presence of suitable foraging and potential roosting habitat for all special-status bat species evaluated for this project, the presence of each species within the proposed project area is assumed.

Environmental Consequences -General

Alternative A – Proposed Project (Federal Action)

Implementation of the proposed project is expected to alter existing habitat and induce disturbance (from equipment activity and resulting noise) within the designated construction areas. Direct effects to existing habitat would occur during the following activities: (1) relocating channel flows from the existing incised channel to the remnant channel(s) on the meadow floodplain in order to obliterate the incised channel, (2) removing and replanting existing meadow and riparian vegetation (sedges and grasses where available) within the new remnant channel(s), filling channel reaches, raising riffle structures, excavating floodplain borrow sites, and installing the grade control structure, and (3) removing vegetation from upland borrow sites to obtain fill material to eliminate the degraded channel.

Indirect effects would occur during the elimination of sections of the existing aquatic/meadow habitat. Elimination of this habitat may result in possible short-term reductions in prey species availability for foraging bats, birds, amphibians, and fish species due to the reduction of in-stream macroinvertebrates (within the pre-project versus post-project aquatic system), which complete their life cycle as reproductive terrestrial, winged insects. Other indirect effects would occur during removal of trees in the upland forested habitat to obtain fill material, as this activity may result in potential reductions in nesting and roosting habitat for birds, foraging and denning habitat for small mammals, and roosting

habitat for bats in the immediate vicinity of the meadow. Tree removal would average approximately 33 trees per acre of conifers with diameters of 6 inches or greater, with the average ranging from 10-12 inches DBH. Approximately three acres would be utilized within the designated borrow site to obtain fill material, resulting in the potential removal of approximately 100 trees. Due to the smaller size of the trees that would be removed, indirect effects on nesting, roosting, or foraging perches for larger birds of prey, such as the bald eagle or northern goshawk, are not expected. However, effects to canopy cover and forest structure may affect habitat quality. Forested habitat is predominately a single tree layer of Jeffrey pine with canopy closures estimated at <60%, interspersed with small openings of sagebrush, rocky outcrops, and dry barren slopes. Tree removal from the upland borrow site would create approximately 3 acres of openings within the stand, affecting potential nesting habitat for species who require denser canopy cover (>50%). Due to the dominance of a single tree layer structure, removal of trees would not significantly alter the existing stand composition.

The only existing activity contributing to cumulative effects in the proposed project area considered in this analysis is livestock grazing. The proposed project area is within the Thompson Valley grazing allotment. Grazing has been a traditional use of much of the meadow habitat on both private and public lands within the Red Clover Creek watershed and is expected to continue. Historical stocking rates of livestock that exceeded carrying capacity on the landscape are believed to be the catalyst for the existing condition in Thompson Meadow. Stocking rates have since been adjusted and standards set in place to minimize grazing effects to the landscape. As part of the proposed restoration activities, new fencing would create a 20-acre riparian pasture that would allow recovery of areas disturbed by construction and allow seasonal management of livestock use in areas with high value wildlife habitat. The fenced meadow would be rested from livestock use for 2-3 years after project implementation to allow vegetation to re-establish and stabilize disturbed areas. It will be important to balance livestock needs with high quality wildlife habitat that can support a diverse species complex within the Red Clover Watershed. The result of finding this balance and maintaining habitats for both livestock and wildlife should help to increase mitigation potential of past and existing disturbance within the watershed. Existing adverse effects from grazing occurring within Thompson Meadow are likely to decrease as water is made more available and quality forage expands over a larger area as a result of restoration actions.

Existing habitat conditions within the larger Red Clover Watershed downstream of the proposed project area are a result of implementing meadow restoration utilizing the pond and plug technique along six miles of Red Clover Creek. The primary goal and objective of the meadow restoration efforts implemented in 2006 and 2010 on Red Clover Creek were to restore the hydrological function of the meadow floodplain to improve the water and sediment retention functions of the watershed. Secondary objectives included reducing bank erosion, attenuating flood flows, increasing base flows, and improving fish and wildlife habitat. By restoring 540 acres of meadow floodplain, these projects have effectively increased avian species richness and abundance, fish numbers, sediment mobilization, and meadow vegetation (Plumas Corp 2010 and 2011). In doing so, these projects have also cumulatively converted approximately 100 acres of riverine habitat to lacustrine (pond) habitat on both public and private lands. The conversion of stream habitat to pond habitat lacking important habitat attributes for native amphibians cumulatively decreases potential native amphibian habitat within the watershed due to the propensity of invasive aquatic species, such as bullfrogs and signal crayfish, for this habitat type. The cumulative addition of another 0.80 acres of ponded water (lacustrine) habitat from the proposed project would provide more opportunity for invasive aquatic species, like bullfrogs, to spread in the watershed. Prior to any meadow floodplain restoration efforts in the watershed, Red Clover Creek and the adjacent Last Chance Creek watershed were known to be infested with the non-native signal crayfish. A consideration that should be noted in addressing cumulative effects of constructed lacustrine habitat, however, is the historical and existing role of beaver in the Red Clover Creek and Last Chance Creek watersheds. Beaver eradication efforts throughout the twentieth century were one of the contributing factors to the degradation of these watersheds. Beaver create pooled water habitat, similar to ponds created by check dams, partial channel fill, and beaver analog

restoration techniques, within the degraded (8-12 foot) entrenched channels. It is within these beaver-created channel ponds in the un-restored and restored reaches of Last Chance Creek and Indian Creek that bullfrog are thriving. Although bullfrog occurrence in the proposed project area and within Red Clover Creek watershed has not been verified to date, their occurrence in adjoining watersheds makes it likely they could eventually inhabit the Red Clover Creek watershed.

It is possible that non-federal actions capable of adding to the proposed project's effects could occur on private lands surrounding the project area. In the immediate vicinity surrounding the Thompson Meadow proposed project area there are an estimated 92 acres of undeveloped private land. Existing land use in this area consists of livestock grazing. Quantifiable data regarding other land uses in this area was not available for this analysis; however, it does not appear that this private land is or will be used in a way that would adversely affect or change existing habitat conditions.

Planned or known foreseeable future federal actions include the landscape-scale Mapes Project, which overlaps with the proposed project area. A timber stand improvement/wildlife habitat enhancement project by the Beckwourth Ranger District, the Mapes Project would entail thinning forested stands, improving roads for water quality, improving springs in the form of juniper removal to improve water yields, enhancing aspen stands, and improving meadows in the form of removing encroaching conifers. Mechanical thinning is planned in the entire forested habitat around the Thompson Meadow Project Area, including the upland borrow sites. The Mapes Project is currently in the conceptual phases of planning and therefore cannot be effectively analyzed for cumulative effects. A site-specific analysis of direct, indirect, and cumulative effects of the Mapes Project, or any other projects capable of producing effects, would be documented in a separate analysis.

Environmental Consequences – Species Specific

Alternative A – Proposed Project (Federal Action)

Management Indicator Species

Table 3 summarizes the existing habitat acreages within the proposed project area and anticipated changes in habitat acreages for MIS species following implementation of the proposed actions. The associated California Wildlife Habitat Relationships (CWHR) (CDFG 2005) habitat classification is presented for each MIS habitat type.

Table 3. Summary of California Wildlife Habitat Relationships habitat type acreages pre- and post-project and Management Indicator Species habitat acres pre- and post-project.

CWHR Habitat type	Project Area Acres (No Action)	Project Area Acres Post-Project (Proposed Action)	MIS Habitat type	Project Area Acres (No Action)	Project Area Acres Post-Project (Proposed Action)
Riverine[1] (perennial)	6.92	5.47	Riverine & Lacustrine/	12.74	12.09
Riverine[1] (intermittent)	1.25	1.25			
Riverine[1] (ephemeral)	4.57	4.57			
Lacustrine	0.00	0.80			
Montane Riparian[2]	0.00	0.65	Montane Riparian[2]	0.00	0.65
Wet Meadow	9.59	23.03	Wet Meadow	9.59	23.03
Jeffrey Pine Forest	13.64	13.64	Coniferous Forest, early and mid seral	13.64	13.64
Grassland	0.48	0.48		30.38	16.94

Sagebrush	24.54	11.10	CWHR not included in MIS Habitat		
Barren/Dry Slopes	5.36	5.36			
TOTAL	66.35	66.35		66.35	66.35

[1]acreage based on 82-foot buffer from channel shoreline
[2]pre-project (No Action) acreage based on willow habitat <1% of entire gully width bottom

Riverine and Lacustrine Habitat (Aquatic Macroinvertebrates)

The proposed action would directly affect stream flow, sedimentation, and water surface shade, thus indirectly affecting aquatic macroinvertebrates within the proposed project area. Changes to stream flow would primarily be due to the restored function of the floodplain. The proposed project would reduce the area of the channel so that flows would overbank onto the floodplain more frequently, likely lessening the sharp peaks and declines in stream flows due to precipitation events. Another effect on flow would be an increase of 0.80 acres of still water (lacustrine) habitat. Hydrologically, this acreage would act as floodplain, i.e. groundwater storage and release, and low velocity regions during overland flow events. The water level in the nine ponds not attached to the channel would seasonally rise and fall with the groundwater level. All of the ponds created by the proposed project would be associated with the restored floodplain. Increased evapotranspiration (ET) due to the proposed project could indirectly affect stream flow. Flow monitoring from other similar projects implemented on the PNF have shown that once the floodplain aquifer is recharged, base flows are augmented downstream of pond and plug projects after two years of average or above-average winter precipitation levels.

Sedimentation is expected to increase during the construction period due to the operation of heavy equipment to construct proposed channel fill, plugs, and associated ponds. This sedimentation would occur in the short-term, primarily over the first year, and would be minimized with implementation of USFS and DWR project design criteria. Due to the elimination of the primary existing source of sedimentation (eroding gully walls) following project construction, sedimentation would be greatly reduced in subsequent years. Any sediment generated during high flow events would also be reduced due to the flow overbanking and depositing sediment on the vegetated floodplain. Monitoring of similar implemented projects in the Red Clover watershed has shown a decrease in sedimentation.

Stream shade is expected to increase over time due to the proposed project. The existing channel lacks streamside vegetation due to the incised channel and eroding banks. The proposed project would eliminate the eroding gully banks and support stabilizing streamside vegetation such as sedges and willows. Sedges from the gully bottom would also be transplanted along with willow cuttings around pond margins and along the remnant and constructed channels, providing water surface shade, as well as bank stability, over the long-term (5+ years). Surface water in the ponds, however, would be subjected to increased solar radiation, which is likely to increase pond surface water temperatures. However, monitoring of similar projects has indicated that temperatures remain cool in pond bottoms, thus providing refugia for coldwater species. Water temperature data collected from similar pond and plug projects has shown an overall decrease in water temperatures post-project. This effect is also expected for the proposed project because the channel would only pass through one pond.

Proposed project-related contributions to a cumulative effect on benthic macroinvertebrates are anticipated to be beneficial. The proposed project, considered together with other past, present, and future actions, is likely to cumulatively affect flow, sediment, and shade. There would be clear improvements to habitat conditions from reduction of sedimentation; conditional improvements to flow, based on the water year; increases in riverine habitat shade; and decreases in lacustrine (still water) habitat shade. Effects of cattle grazing in the meadow are likely to spread out over a larger acreage, thereby resulting in less overall impact.

The proposed project activities would affect 6.92 acres of existing riverine habitat and create 0.8 acre of lacustrine habitat. Results of the proposed restoration activities are expected to decrease sediment, improve flow conditions, increase riverine shade, and possibly decrease lacustrine shade in the

Thompson Meadow Restoration & Water Budget Evaluation Project; therefore, the proposed project would not alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities would result in the conversion of approximately 1.5 acres of degraded riverine perennial habitat to montane riparian and lacustrine habitat. Restoration and creation of these habitat types would improve habitat quality and enhance remaining riverine habitat by improving flow conditions, increasing water surface shade, and decreasing sedimentation, resulting in an overall beneficial effect. Construction-related adverse impacts to riverine habitat, such as sedimentation and vegetation removal, would be short-term in nature, would be minimized with implementation of USFS and DWR project design criteria, and would be considered less than significant. Post-construction cattle grazing practices are anticipated to reduce existing impacts, resulting in a beneficial effect.

Montane Riparian Habitat (Yellow Warbler)

Implementation of the proposed project would have a beneficial direct and indirect effect on yellow warbler habitat due to the restoration of willow riparian cover. Because of the restored water table, riparian habitat would likely expand from the bottom of the gully to the meadow surface and along the restored perennial channel, indirectly creating habitat that willow would thrive in. The few scattered willows within the incised channel would be transplanted to the meadow surface, in addition to willow cuttings that would be planted along pond and plug edges and stream banks directly resulting in an increase in willow cover along the restored channel from <0.1 acre to an estimated 0.65 acre (approximately a third of the restored channel width). Over time willow cover could expand in the moist environment, creating suitable yellow warbler habitat in the long-term (within five years after project implementation).

Cumulatively the proposed project would increase the quantity and continuity of riparian habitats along the channel in Thompson Meadow. Livestock grazing is likely to continue to affect willow and riparian habitat, but will not alter the existing trend in the habitat.

The potential increase of 0.65 acre of riparian and willow habitat in the proposed project area would not alter the existing habitat trend, nor would it lead to a change in the distribution of yellow warblers across the Sierra Nevada bioregion.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities intended to restore montane riparian habitat would result in the conversion of degraded riverine perennial habitat. However, restoration of montane riparian habitat would enhance the quality of remaining riverine habitat, resulting in a beneficial effect. Post-construction, impacts from grazing practices are anticipated to decrease, decreasing potential adverse effects to mountain suckers and their habitat and resulting in a beneficial effect.

Wet Meadow Habitat (Pacific Tree Frog)

Prior to Euro-American settlement Red Clover Valley was a large wetland (Beckwourth RD 2006). The primary purpose of this alternative is to restore the meadow hydrology by reconnecting the stream channel with the meadow floodplain, thereby raising the water table so that the gully no longer acts as a drain, as well as treating headcuts that would further drain the project meadow. This would also result in improved infiltration and longer water retention in (and slower release from) the project meadow area. Wet meadow habitat is expected to increase from the existing 9.59 acres to 23.03 acres, converting 13.44 acres of sage-dominated meadow to wet meadow habitat. These changes in vegetation would be due to the altered hydrology. The changes in vegetation could also, in turn, affect the hydrology by increasing evapotranspiration, potentially resulting in a decrease in late season flows following two or more dry winters. Late season flows, however, are likely to be increased following wet

winters, and for two years following wet winters, as the shallow floodplain aquifer releases the stored water.

The cumulative effects of grazing under the proposed project should decrease as grazing would be spread out over a larger area, and would not alter the existing trend in the habitat.

The proposed project would result in an overall increase of wet meadow habitat of 13.44 acres within the project area. This increase would not alter the existing trend in these habitats, nor would it lead to a change in the distribution of Pacific tree frogs across the Sierra Nevada bioregion.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities would result in an increase of approximately 13.5 acres of wet meadow, eliminating sagebrush habitat that has replaced historic wet meadow habitat and improving habitat quality, resulting in a beneficial effect. Post-construction, impacts from grazing practices are anticipated to decrease, resulting in beneficial effect on wet meadow habitat.

Early and Mid Seral Coniferous Forest (Mountain Quail)

The proposed project identifies 13.64 acres of upland eastside pine habitat as borrow sites to obtain 8,200 cubic yards of fill for the channel restoration in the meadow. Although a total of 13.64 acres have been identified, the total area of excavation needed to generate the required borrow material would be much smaller at approximately 3 acres. Larger areas were identified to allow excavation to occur in areas where the best material is found and where excavation can be best situated into the hillside. Average borrow depths would vary from 3 to 5 feet and would taper into the existing hill slope. Topsoil in these excavated areas would be set aside and then spread over the cut areas to retain soil organic matter in the upper soil horizon. The excavated areas would be replanted with a mix of native shrubs, forbs, and conifer species. Tree removal would average approximately 33 trees per acre of conifers with diameters of 6 inches or greater, with the average ranging from 10-12 inches DBH. Approximately three acres would be utilized within the designated borrow areas to obtain fill material, resulting in approximately 100 trees being potentially removed. Due to the small area of impact (approximately 3 acres) and replanting of conifer species, understory shrubs, and forbs, the proposed project would not result in a net change of any of the existing habitat factors, such as tree size classes, canopy cover, or shrub understory.

Proposed project-related contributions to a cumulative effect on mountain quail are anticipated to be negligible. The change of eastside pine habitat factors (i.e. tree size classes, canopy cover, or shrub understory) within the proposed project area would be minimal, resulting in no alteration of the existing trend in the habitat.

The proposed project would not result in any net change in early to mid seral coniferous forest habitat in the proposed project area, and therefore would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities would result in the temporary disturbance of approximately 2-3 acres of Jeffrey pine forest. Post-construction, disturbed areas would be spread with native topsoil and replanted. Replanted areas would not have the same tree size class, canopy cover, or shrub understory as the existing vegetation, but would maintain continuity of this habitat type and would mature over time, resulting in a less than significant impact.

Alternative B – No Action

The No Action Alternative would result in no change to the existing MIS habitat factors. Existing conditions would remain the same.

Compliance with the Forest Plan and Other Direction

Analysis of potential effects of the proposed project to MIS habitat factors is in compliance with the Forest Plan. The analysis includes determining potential effects to MIS.

Special-Status Animals

Western Bumble Bee

Potential direct effects could include injury or mortality to bees, digging up and/or burying nest sites, and noise disturbance during construction. Direct short-term effects to habitat could include a temporary decrease in flowering plants removed or trampled during construction. These effects would be lessened by construction occurring during the fall (September-October) when fewer plants are flowering. However, this period is also when, after mating, the reproductive female bees (gynes) begin to search for a suitable overwintering site underground. Disturbance or destruction of overwintering sites would affect the following year's reproduction. Unfortunately, very little is known about the hibernacula (overwintering sites) of Western bumble bees (Jepson et al. 2014), although Hobbs (1968) reported *B. occidentalis* hibernacula that were two inches deep in a "steep west slope of the mound of earth." The closely related *B. terrestris* reportedly hibernates beneath trees (Hobbs 1968). Any excavated vegetation and top soil would be transplanted to other areas in the meadow, reducing the direct effects to flowering plants. Long-term direct effects to habitat would be beneficial with the increased groundwater levels in the meadow expanding the extent of flowering plants associated with wet to moist soil conditions. The majority of flowering plants that occur in the upland areas are found on the open slopes, outcrops, and sage flats, which would not be directly disturbed. Restoring the meadow floodplain hydrology would affect approximately 14 acres of sage habitat in the meadow, converting it to more mesic plant communities. It is expected that xeric-associated flowering plants would be replaced with mesic-flowering species, so there would be no net loss of foraging habitat.

While restoring the meadow floodplain would increase the mesic plant communities and their associated flowering plants, the expected increase in groundwater levels could potentially decrease rodent burrowing in the meadow. This would indirectly affect the availability of nesting and overwintering habitat for Western bumble bees within the meadow. However, given the abundance of rodents throughout the project area and surrounding area and open, west-to-southwest facing slopes bordered by conifers that offer other prospective nesting and overwintering sites, the loss of available rodent burrows and drier habitat in the meadow is not expected to have an adverse effect on the Western bumble bee.

Livestock grazing is a cumulative action that has the potential to decrease the availability of flowering plants for the Western bumble bee. Cattle's main diet consists of graminoids, however they will opportunistically graze flowering plants. Grazing standards and guides are set in place to ensure impacts to the landscape and wildlife from grazing are minimal.

The proposed project may temporarily adversely affect Western bumblebee habitat, but is not likely to result in a trend toward Federal listing or loss of viability for the Western bumble bee.

CEQA Considerations

This species was not evaluated under CEQA.

Mountain Sucker

Potential direct effects to mountain suckers that would result from construction activity in the stream channel could include fish being stressed by decreased water quality conditions, buried in channel fill, and/or stranded in dewatered channel reaches. The likelihood of these effects would be minimized or avoided through the removal and relocation of all fish species prior to construction and the implementation of best management practices to protect water quality. Potential direct effects to mountain sucker habitat would also result from the existing low flow channel being re-established in

remnant and constructed channels on the meadow floodplain. Because suckers are associated with a wide range of substrates from silt to cobble and boulders, the “new” base flow channel in connection with the existing channel is expected to provide adequate habitat conditions to sustain mountain suckers in Thompson Creek.

The creation of ponds could create habitat for predatory invasive species such as bullfrogs. Bullfrogs are generalist carnivores and will eat anything they can catch and swallow (Palermo 2015). Bullfrogs were not detected during the 2017 amphibian surveys conducted in the Thompson Meadow project area. They were also not found in the watershed during amphibian surveys for the following restoration projects: Red Clover Creek Erosion Control Project (1985), located approximately 1.0 mile downstream of the proposed project; Red Clover Creek/ McReynolds Creek Restoration Project (2006), located 0.20 miles downstream; Red Clover-Poco Restoration Project (2010), located 3.5 miles downstream; and the Dotta Canyon Restoration Project (2013), located on Red Clover Creek 7.0 miles upstream. An unconfirmed sighting in 2008 of bullfrog tadpoles was made by a DWR biologist conducting waterfowl surveys in the Red Clover/McReynolds Project; however, no bullfrogs have been reported since on the Red Clover/McReynolds Project, nor were they detected in subsequent amphibian surveys conducted upstream and downstream of the Red Clover/McReynolds Creek project area. Although bullfrogs are not known to occur in the Red Clover Creek watershed, they are known to inhabit the adjoining watersheds of Last Chance Creek and Indian Creek. Pre- and post-restoration evaluation of fish assemblages in Last Chance Creek and tributaries by DWR in 1997, 2001, 2005, and 2008 documented mountain suckers, indicating mountain suckers coexist with bullfrogs in the Last Chance watershed (FRCRM 2013). Given the occurrence of bullfrogs in Last Chance and Indian Creek watersheds, it is probable they could eventually inhabit the Red Clover Creek watershed. If bullfrogs do colonize the proposed project area, they could potentially reduce the number of mountain suckers, but it is unlikely they would eliminate the population.

Livestock grazing can degrade stream habitat for fish. Cumulative effects of livestock grazing on mountain sucker habitat within the proposed project area are likely to decrease with proposed restoration as quality forage is expanded over a larger area, resulting in less livestock concentration along the stream corridor. Reintroduction of livestock would be managed to protect and sustain riverine, riparian, and wet meadow habitats. Livestock would be excluded from the restored meadow for 2-3 years after project implementation until vegetation is well established and streambanks have stabilized. Eventual use of the excluded riparian pasture would likely be restricted to late season after the meadow has dried out and stream flows are low. This would effectively result in shorter duration of livestock use along the creek, decreasing potential adverse effects to mountain suckers and their habitat.

Implementation of the proposed project may adversely affect individuals and habitat, but is not likely to result in a trend toward Federal listing or loss of viability for the mountain sucker.

CEQA Considerations

Refer to the Alternative A discussion. If mountain suckers were stressed by decreased water quality conditions, buried in channel fill, and/or stranded during in-channel work, impacts would be potentially significant. However, implementation of the fish protection measure described below would reduce impacts to less than significant. Construction activities would result in the conversion of approximately 1.5 acres of degraded riverine perennial habitat to montane riparian and lacustrine habitat. Restoration/creation of these habitat types would maintain fish passage and enhance remaining riverine habitat, resulting in a less than significant impact, and potentially beneficial effect, on mountain suckers and their habitat. Livestock exclusion from the meadow for up to three years would reduce direct impacts to this species and result in a beneficial effect.

Avoidance, Minimization, and/or Mitigation Measures

Prior to construction in each treatment reach, water would be diverted around the treatment area to protect water quality and downstream aquatic life. Native fish, including the mountain sucker, as well

as non-native fish, would be removed from each work area just after water diversion, using a backpack electro-shocker. The fish would be transported to the nearest area with adequate suitable habitat.

Southern Long-toed Salamander

Potential direct effects to the Southern long-toed salamander would result from construction disturbance of subterranean adults or habitat. There is the potential to dig up subterranean adults while excavating fill material in the meadow and upland forest sites. Because construction would occur in the fall there would be no potential for trampling migrating breeding adults. Two of the three existing temporary ponds that may provide breeding habitat are outside of the proposed project area, so they would not be directly or indirectly impacted by the proposed project actions. The third temporary pond is on the meadow floodplain at the northern end of the proposed project area on the east side of the existing degraded channel. This ponded area is vegetated and stays wet for most of the season. It is suspected there is an underground spring or seep that keeps this area wet. The “new” base flow remnant channel would run through this ponded area after project implementation, changing this habitat from a ponded environment to a seasonally lotic stream environment in the spring that would be non-conducive for breeding. However, wetland habitat would be created on the west side of the stream channel through the shallow excavation of meadow material for channel fill. This would result in a low meadow wetland area that would seasonally hold water and a robust community of wet meadow vegetation. Long-term direct effects to Southern long-toed salamander habitat would be beneficial with the creation of ponds and the meadow staying wetter for a longer period in the spring/early summer.

Implementation may result in enhancement of existing areas of marginal habitat by extending the length of time surface water remains within the meadow, creating additional temporary ponded breeding areas. Indirect effects from increased ponded water habitat (lacustrine habitat) within the proposed project area could also be detrimental due to the propensity for invasive aquatic species, such as bullfrogs, for this habitat type. Bullfrog occurrence in the proposed project area and throughout the Red Clover Creek watershed has not been confirmed to date; however, they are known to inhabit the adjoining watersheds of Last Chance Creek and Indian Creek, making it probable they could eventually inhabit Red Clover Creek watershed. If bullfrogs do colonize the proposed project area, they are likely to preclude any potential colonization of listed amphibians because bullfrogs are known to out-compete, and prey upon, other amphibian species.

Amphibians are subject to trampling from grazing livestock. Cumulative effects from grazing would likely diminish under this alternative because restoration of the site would expand the extent of quality forage over a larger area. Under Alternative A, cattle would be excluded from the meadow for 2-3 years. After the meadow vegetation recovers, livestock use of the meadow riparian pasture would likely be restricted to late season use after the meadow has dried out and salamander breeding migrations and metamorphosis has occurred. This would effectively result in decreasing potential adverse effects to salamanders and their habitat from livestock. Ponded water habitat within the proposed project area would increase by 0.80 acre, cumulatively providing more sites for invasive bullfrogs to spread within the watershed.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Southern long-toed salamander.

CEQA Considerations

Refer to the Alternative A discussion. Presence of Southern long-toed salamander is assumed; if excavation of subterranean adults were to occur, it would result in a potentially significant impact. However, implementation of the protection measure described below would reduce potential impacts to less than significant. Impacts to potential salamander habitat would be temporary, and post-construction habitat quality and quantity would be improved, resulting in an overall beneficial effect. Changes in grazing practices post-construction would also result in an overall beneficial effect.

Avoidance, Minimization, and/or Mitigation Measures

Should any special-status species be located during project activities, a Forest Service approved biologist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.

Bald Eagle

Due to the marginal quality of nesting and foraging habitat within the proposed project area, effects to bald eagles are not anticipated. Potential direct effects to bald eagles may result from construction noise disturbance of foraging birds. However, preferred fish prey is sparse within the proposed project area. Based on the lack of bald eagle detections, presence of marginal nesting habitat, and paucity of preferred prey within the project area, bald eagles are not expected to be directly affected on a short- or long-term basis by the proposed project actions.

Short-term indirect effects to bald eagles could result from construction activity in the stream channel affecting fish prey by decreasing water quality conditions, burying fish in the channel fill, and/or stranding fish in dewatered channel reaches. The likelihood of these effects would be minimized or avoided through the removal and relocation of all fish species prior to construction and the implementation of best management practices to protect water quality. The re-established low flow channel in remnant and constructed channels on the meadow floodplain would take time to evolve and develop habitat characteristics required by preferred fish prey, such as trout. Over time, if trout become more prevalent in the proposed project area, the proposed project may expand foraging habitat, especially for sub-adult eagles that have not yet established a foraging and breeding territory.

On-going grazing is not known to disturb bald eagle foraging behavior, therefore no cumulative effects to bald eagles are expected under the proposed project.

Implementation of the proposed project would not affect the bald eagle.

CEQA Considerations

Refer to the Alternative A discussion. Based on lack of species presence and lack of suitable habitat, as well as the limited availability of preferred prey species, implementation of the proposed project would have no impact on bald eagles.

Greater Sandhill Crane

The proposed project has the potential to provide forage and resting areas for migrating sandhill cranes during the spring and fall. Short-term direct effects of the proposed project would occur in the fall due to noise disturbance and activity during project construction. Disturbance from construction could potentially curtail use of the project area and immediate surrounding area for resting and foraging during the fall migration. A recent meadow restoration project with known occurrences of sandhill cranes (Greenville Creek Meadow Restoration Project) was implemented in the fall of 2016 in Lassen County. During construction cranes were observed within 0.5 mile or less of the operating heavy equipment (Plumas Corporation 2016), indicating the equipment noise and activity did not hinder their use of the area during the fall migration. Long-term direct effects to habitat are anticipated to be beneficial by improving and expanding suitable habitat (ponded water and wet meadow) for resting, foraging, and potential nesting sandhill cranes.

Sandhill cranes primarily feed on grasses, forbs, cereal crops, roots, and tubers, while animal matter such as insects, mice, crayfish, and frogs are taken opportunistically. Young sandhill cranes depend mostly on invertebrates during their first five to six weeks. Indirect effects on sandhill cranes from implementation of the proposed project could include short-term (6 months to 1 year) effects to food resources through the removal of existing meadow vegetation and excavation of ponds, which could disrupt the existing invertebrate (insect) populations. Due to crane presence documented near the proposed project area but not in the proposed project area, the short-term disturbance is not expected

to adversely affect sandhill cranes. Over the long-term, food items in the proposed project area are likely to be more abundant under the proposed project than under existing conditions.

Existing grazing practices may affect sandhill crane nesting within the proposed project; however given the lack of existing suitable nesting habitat, effects are not expected. Restoration activities are expected to improve or create more suitable nesting and foraging habitat in the future. As habitat conditions improve post-restoration, it is anticipated the proposed project area would be used primarily for resting and foraging during spring and fall migration, similar to use of the downstream restored areas. Existing seasonal livestock use of the proposed project area and surrounding area is permitted for 40 cow/calf pair from June 1 to August 30, but can vary from season to season. In the event nesting cranes are discovered, an LOP would be implemented. After implementation the proposed project area would be rested from grazing for 2-3 years until meadow vegetation has recovered, at which time livestock use of the meadow riparian pasture would likely be restricted to late season use after the meadow has dried out. Dependent on annual precipitation this could be any time from July through September. Since cranes generally breed and nest from April through late August, nesting opportunities in the meadow would still be affected by cattle after implementation of the proposed project. However, livestock use does not appear to inhibit resting and foraging use of other restoration projects within the Red Clover Creek watershed per observations of cranes in grazed meadows downstream of the proposed project area.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the greater sandhill crane.

CEQA Considerations

Refer to the Alternative A discussion. Based on lack of species presence in the proposed project area, marginal foraging and resting habitat, lack of nesting habitat, and the short-term construction period, implementation of the proposed project is not anticipated to adversely affect greater sandhill cranes, resulting in a less than significant impact. Meadow restoration would create suitable habitat for the greater sandhill crane, resulting in a beneficial effect. Post-project grazing would likely overlap with the nesting season for this species but would incorporate adaptive management, resulting in a less than significant impact.

Long-eared and Short-eared Owls

Implementation of the proposed project would occur in the fall after the nesting period for long-eared and short-eared owls. Short-term direct effects from heavy equipment activity and noise disturbance would likely limit foraging and roosting use of the open meadow, surrounding sagebrush, and immediately adjacent forested habitat during the short construction period (up to 3 months). Over the long-term, restoration of the meadow floodplain habitat would increase the abundance and density of wetland grasses and forbs, improve foraging habitat for both long- and short-eared owls, and improve nesting habitat for the short-eared owl.

Long-and short-eared owls prey mostly on small mammals, primarily voles and mice. Short-term (6 months to 1 year) indirect effects on prey resources through the removal of existing meadow vegetation, excavation of ponds, and channel filling could disrupt existing prey populations; however, over the long-term the restoration is expected to provide more suitable habitat for voles, a preferred prey item for both owl species. Increased wet meadow vegetation cover and forage would benefit other prey species as well.

The improved forage and limited grazing use of the project area after implementation of the proposed project would likely improve foraging habitat conditions for the long-and short-eared owl, as well as nesting conditions for the short-eared owl within the proposed project area. However, as a ground nesting bird, continued annual livestock grazing of the restored meadow would likely preclude short-eared owl nesting within the proposed project area.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the long-eared owl and the short-eared owl.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities may disturb the long-eared and short-eared owl, but construction would be short-term in nature and suitable habitat for both species occurs in other nearby meadow restoration areas. Construction-related impacts would therefore be less than significant and would be further reduced with adherence to PNF LMP guidelines for vegetation removal. Meadow restoration would improve habitat suitability for these species, resulting in a beneficial effect. Post-project grazing would likely overlap with the nesting season for the short-eared owl, but would incorporate adaptive management, resulting in a less than significant impact.

Continued grazing would have a less than significant impact on the long-eared owl.

Northern Goshawk

Implementation of the proposed project would begin in mid-August late in the goshawk nesting season (Feb 15-Sept. 15), dependent on the presence of any nesting special-status species. Direct effects from heavy equipment activity and noise could potentially disturb nesting birds in mid-August and would likely in the short-term limit foraging use of the meadow and surrounding open sagebrush and forested habitats. However, adherence to the protection measures listed below would avoid or minimize nest disturbance. Removal of trees from the upland borrow sites would create approximately 3 acres of openings within the stand, affecting potential nesting habitat, yet providing foraging habitat. Effects to canopy cover and forest structure may affect habitat quality. Forested habitat is predominately a single tree layer of Jeffrey pine with canopy closures estimated at <60%, interspersed with small openings of sagebrush, rocky outcrops, and dry barren slopes. Due to the dominance of a single tree layer structure, removal of trees would not significantly alter the existing stand composition.

Top soil from the excavated areas would be stockpiled and spread over the cut areas to retain the organic matter in the upper soil horizons. These sites would then be replanted with native forbs, shrub, and conifer species, which could potentially enhance future foraging habitat for goshawks by providing habitat for small mammal prey species.

Implementation of the proposed project could have a beneficial indirect effect for the northern goshawk by improving the foraging habitat within the meadow due to increased herbaceous vegetative cover and forage for small mammal prey species. In addition, indirect effects to upland forested habitat could be beneficial to goshawks by improving forest stand conditions for foraging through the creation of small openings and retention of large woody debris, which would provide accessibility to created cover and habitat for small mammal prey species.

On-going grazing is not known to disturb northern goshawk foraging behavior, therefore no cumulative effects to northern goshawks are expected under the proposed project.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities may disturb the northern goshawk, but construction would be short-term in nature and suitable habitat for this species occurs in adjacent areas. Construction-related impacts would be less than significant with implementation of the protection measure described below and adherence to PNF LRMP guidelines for vegetation removal. Meadow restoration is anticipated to improve habitat suitability for this species, resulting in a beneficial effect. Continued grazing practices would have a less than significant impact.

Avoidance, Minimization, and/or Mitigation Measures

- Trees with existing raptor nests would be left on the landscape.

- Prior to the initiation of project construction activities occurring during the bird nesting season (February 15th through September 1st), the entire project area would be surveyed by a Forest Service approved biologist. If special-status bird nests are found during pre-construction surveys, the areas would be marked as environmentally sensitive and nests would be monitored by a Forest Service approved biologist for signs of disturbance during construction. If a Forest Service approved biologist determines project construction activities have the potential to disturb the nest site, standard USFS management LOPs would be implemented within ¼ mile of known active nests. CDFW would also be notified of the nesting activity.

- Standard USFS management requirements include limited operating periods (LOPs) when disturbance to wildlife is identified as a concern. The following Limited Operation Periods (LOPs) would be implemented within ¼ mile of known active nest sites: American Peregrine Falcon, February 1st – August 31st; California Spotted Owl: March 1st – August 15th, Northern goshawk: February 15th – September 15th, Bald eagle: January 1st – August 1st. Dates may be adjusted if surveys are conducted prior to project implementation by a Forest Service approved biologist verifying that no active nest sites of the identified wildlife species occur within ¼ mile of construction activities.

Northern Harrier

Implementation of the proposed project would occur in the fall after harrier nesting has occurred. Short-term noise disturbance from heavy equipment activity is likely to limit foraging use of the meadow and surrounding open sagebrush habitat. However, expected long-term direct effects to habitat created by the proposed restoration (increased wetland grasses and forbs) would improve nesting and foraging habitat for the northern harrier.

Northern harriers predominately prey on small mammals, especially voles, as well as birds, frogs, small reptiles, crustaceans, and insects. Indirect effects on harriers from implementation of the proposed project could include short-term (6 months to 1 year) effects on prey species through the removal of existing meadow vegetation, excavation of ponds, and channel filling, which could disrupt existing prey populations. Long-term indirect effects anticipated would be an increase in prey species abundance due to increased wet meadow vegetation cover and forage for all harrier prey species.

The presence of cattle grazing is likely to preclude northern harrier nesting within the proposed project area due to the potential for livestock or other wild ungulate herds, such as deer or elk, to trample eggs and nestlings underfoot. Duebbert and Lokemoen (1977) found that northern harriers did not nest in grazed habitats. Dead vegetation from previous growing seasons is minimized by existing seasonal grazing of the meadow, removing this important component for natural harrier nesting cover. The frequent sightings of northern harriers in the proposed project area indicate regular use of the area for foraging and possibly roosting. The improved forage and imposed grazing management due to implementation of the proposed project (i.e. livestock exclusion from the meadow for up to three years), and presumed late season use of the riparian pasture after the non-use period, would likely improve nesting and foraging habitat for the northern harrier within the proposed project area. However, due to the propensity for harriers to nest in un-grazed habitats it is unlikely they would nest within the restored meadow despite expected improved habitat conditions.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the northern harrier.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities may disturb the northern harrier, but construction would be short-term in nature and suitable habitat for this species occurs in adjacent areas. Construction-related impacts would therefore be less than significant. Meadow restoration is anticipated to improve habitat suitability for this species, resulting in a beneficial effect. Changes in grazing practices are also anticipated to result in a beneficial effect for this species.

Swainson's Hawk

Swainson's hawk nest from late March to late August. Implementation of the proposed project would occur from August 15 through November 15, dependent on the presence of any nesting special-status species. Direct effects from heavy equipment activity and noise could potentially disturb nesting birds in mid-August and would likely limit foraging use of the meadow and surrounding open sagebrush habitat. However, adherence to the protection measures listed below would avoid or minimize nest disturbance. Similar to other raptors evaluated, it is expected that habitat created by the proposed restoration would have a long-term beneficial direct effect on foraging habitat for the Swainson's hawk by potentially improving and increasing prey habitat.

Similar to other raptor species, indirect effects to prey species would be both short-term (6 months to 1 year) disruption of existing prey populations through removal of existing meadow vegetation, excavation of ponds, and channel filling; and long-term by improving vegetative cover and forage for all prey species.

Swainson's hawks are known to forage in grasslands, agricultural fields, and livestock pastures; therefore, seasonal presence of cattle grazing in the proposed project area could affect this species. The improved forage and imposed grazing management due to implementation of the proposed project would likely improve foraging habitat for the Swainson's hawk within the proposed project area.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Swainson's hawk.

CEQA Considerations

Refer to the Alternative A discussion. If an active Swainson's hawk nest is located within the project area at the start of construction activities, disturbance of the nest could cause nest abandonment and result in a potentially significant impact. Implementation of the nest protection measures described below would reduce potential impacts to less than significant. Meadow restoration is anticipated to improve habitat suitability for this species, resulting in a beneficial effect. Continued grazing practices would have a less than significant impact.

Avoidance, Minimization, and/or Mitigation Measures

- Trees with existing raptor nests would be let on the landscape
- Prior to the initiation of project construction activities occurring during the bird nesting season (February 15th through September 1st), the entire project area would be surveyed by a Forest Service approved biologist. If special-status bird nests are found during pre-construction surveys, the areas would be marked as environmentally sensitive and nests would be monitored by a Forest Service approved biologist for disturbance during construction. If a Forest Service approved biologist determines project construction activities have the potential to disturb the nest site, standard USFS management LOPs would be implemented within ¼ mile of known active nests. CDFW would also be notified of the nesting activity.

Yellow Warbler

Implementation of the proposed project would not directly affect yellow warbler habitat due to the lack of willow and other shrubby riparian cover within the project area. Existing occurrence of yellow warblers within the proposed project area likely consists of foraging birds utilizing the surrounding dry sagebrush hill slopes and suitable willow riparian habitat a half mile downstream on Red Clover Creek. Short-term late season noise disturbance from construction activity may limit foraging use of the meadow and surrounding open sagebrush habitat; although as a migrant and summer resident, this species would likely be migrating south during the implementation period. Planting of willow cuttings to provide soil stabilization along pond and plug edges and stream banks is expected to create suitable yellow warbler habitat in the long-term (within five years after project implementation).

Due to the late season construction of the proposed project and the likelihood that warblers would be migrating south, indirect effects to insect prey species for the yellow warbler are not expected. Post-implementation indirect effects are expected to be beneficial, with increased wetland habitat creating improved habitat conditions for insect fauna.

The presence of cattle grazing has likely resulted in the lack of willow and riparian shrub habitat along the creeks within the proposed project area. However, willow plantings and limited grazing use of the project area after implementation of the proposed project is expected, long-term, to create suitable nesting habitat for the yellow warbler within the project area.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the yellow warbler.

CEQA Considerations

Refer to the Alternative A discussion. Based on the migratory nature of the yellow warbler and lack of willow and other shrubby riparian cover, construction activities are anticipated to have no impact or a less than significant impact on this species. The likelihood of an adverse impact occurring would be further reduced with implementation of the nest protection measure described below. Meadow restoration would improve habitat suitability for this species, resulting in a beneficial effect. Changes in grazing practices are also anticipated to result in a beneficial effect for this species.

Avoidance, Minimization, and/or Mitigation Measures

If practicable, shrub layer vegetation would be removed outside of the bird breeding season (i.e., removal would occur between September 1st and November 15th).

American Badger

Short-term direct effects to badgers from noise disturbance during construction is likely; however, this species is somewhat tolerant of human activities (Ziener et al. 1988-1990). Badgers are generally most active at night, so construction noise during the day could potentially disturb sleeping badgers in underground burrows. Badger holes were observed along the perimeter of the meadow, outside of the proposed project borrow sites. Because badgers prefer dry, friable soils it is unlikely they would burrow in the meadow where soils tend to be more fine textured and moist. This lessens the probability of accidentally excavating a badger den in the meadow; however, removal of soil material from the upland forested sites could potentially disturb undetected badger burrows. Long-term direct effects to badgers would result from a reduction in dry meadow habitat along the perimeter of the meadow due to proposed restoration actions resulting in an expansion of wet meadow habitat.

Potential indirect effects to the American badger would consist of loss of prey species habitat around the meadow perimeter due to restoration actions raising the groundwater table and increasing wetland habitat in the meadow. The main prey base species for badger (rats, mice, chipmunks, ground squirrels, and pocket gophers) are associated with drier habitats. Disturbance of the upland eastside forest habitat for borrow material could disturb badger prey in the short-term, but is unlikely to affect prey abundance in the long-term within the proposed project area.

On-going grazing is not expected to affect badger use of the proposed project area. One of badger's preferred habitats is cattle pastures (Woodroffe et. al. 2016); therefore, no cumulative effects to the American badger are expected under this alternative.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the American badger.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities at the borrow sites would be short-term in nature and unlikely to directly affect badgers or have long-term effects on their prey base, resulting in a less than significant impact. Meadow restoration would reduce the amount of dry soils available for

badger burrows and suitable habitat for preferred prey species along the perimeter of the meadow but would not be expected to have a substantial adverse effect on this species because badger burrows were not observed within the project area and suitable habitat surrounds the proposed project area. Impacts from meadow restoration are therefore expected to be less than significant. Continued grazing is anticipated to have a less than significant impact or no impact on this species.

Western White-tailed Jackrabbit

Presence of white-tailed jackrabbits has not been documented in the proposed project area; however, suitable habitat for this species is present. If jackrabbits are denning or foraging in or near the proposed project area during implementation, short-term direct effects would include noise disturbance from heavy equipment activity and the possibility of accidentally excavating a rabbit den. Direct effects to preferred jackrabbit habitat within the proposed project area (sagebrush, conifer, and grassland) would include conversion of sagebrush and grassland habitats to wet meadow and lacustrine habitats. Small openings within conifer habitat that would be created from excavating borrow material would be re-planted with native shrubs, forbs, and grasses, resulting in no long-term habitat loss.

Anticipated indirect effects on white-tailed jackrabbits from restoring the meadow floodplain would involve conversion to forage preferred by jackrabbits. Expansion of wetland plant communities would increase the availability of grasses and forbs for jackrabbits to feed on. The expected change in groundwater levels should also extend the growing season for vegetation in the meadow, providing food resources for jackrabbits later into the season.

Overgrazing can adversely affect jackrabbits. However, livestock use in the proposed project area would be restricted seasonally within the meadow resulting in improved forage conditions for white-tailed jackrabbits.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Western white-tailed jackrabbit.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities would be short-term in nature and unlikely to adversely affect the white-tailed jackrabbit. However, if a rabbit den were accidentally excavated, the impact would be potentially significant. Implementation of the protection measure below would reduce potential impacts to less than significant. Conversion of habitat types within the proposed project would increase the availability of preferred forage plants for this species, resulting in a beneficial effect. Changes in grazing practices would have a less than significant impact on the white-tailed jackrabbit and may result in a beneficial effect.

Avoidance, Minimization, and/or Mitigation Measures

Should any special-status species be located during project activities, a Forest Service approved biologist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.

Bats - Fringed Myotis, Pallid, Spotted, Townsend's Big-eared, and Western Red

All five listed bat species evaluated have habitat associations with forested and riparian habitats, particularly edge habitats along streams and adjacent to wooded habitats, rocky outcrops, and open water. Three of the five bat species (Myotis, Pallid, and Western Red) were detected in 2017 during acoustic surveys conducted within the proposed project area.

Suitable habitat exists within the proposed project area for all bat species considered in this analysis. Direct effects from the proposed project would affect all species equally. Direct effects may include short-term disruption of foraging habitat and disruption and/or potential loss of commuting corridors and roosting habitat. Short-term disturbances during construction would include heavy equipment noise and increased human activity during construction; although, due to the occurrence of this activity

during daylight hours when foraging is not occurring, disturbance to foraging is expected to be minimal. Habitat disruption, noise, and modification of forested habitat in the upland borrow sites could directly affect roosting bats and commuting corridors. Regarding the spotted bat, there would be no habitat disruption or modification to rock outcrops within the project area; however, noise from project activities may negatively affect roost sites. Adherence to the protection measures listed below would avoid or minimize disturbance to roosting bats..

Implementation of the proposed project is expected to result in a short-term reduction or disturbance in prey abundance for bat species that predominately forage within and along the edges of meadow and riparian corridor habitats (Spotted, Townsend's big-eared, and Western red). The proposed project would result in the removal of existing meadow vegetation and excavation of ponds, which could disrupt the existing insect populations that are the prey base for these species. Each of the three sensitive bat species noted above uses meadow, riparian, and standing open water habitat as foraging areas. Implementation of the project may result in a short-term (6 mos. to 1 yr.) reduction in the availability of their prey species. Because bats are volant, they have unusually large home ranges for their size and are able to utilize multiple habitat settings for different purposes. Foraging bats will utilize habitat areas that have edge, both vertical and horizontal. These areas (forest/meadow edges) are used as travel or commuter ways between other habitat types that may be utilized. Over the long-term (3 to 10 years or possibly less), once the proposed ponds have developed flora and fauna, they may provide additional foraging habitat that benefit these bat species. Several bat studies demonstrate the importance of reliable sources of water to these species, both natural and artificial sources, such as small residual pools, cattle troughs, tanks, ponds, springs, and seeps (Taylor and Tuttle 2007). Implementation of the proposed project is likely to benefit all three of the aforementioned sensitive bat species in the long-term. Negative indirect effects would include the removal of trees and snag disturbance in the upland borrow sites and from widening the road. The removal of trees decreases the potential for future snags that may act as roosting sites, reduces cover, and impacts commuting corridors. Disturbing snags at the borrow sites or while widening the road may cause snags to prematurely fall over, reducing future or existing roost sites. Project design criteria, per 2004 SNFPA guidelines, would retain 3 snags per acre with a DBH greater than 15 inches.

Because of the presence of bats in areas that experience cattle grazing under existing conditions, it is not likely that there would be cumulative effects to any bat species from grazing.

Implementation of the proposed project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Fringed myotis, Pallid, Spotted, Townsend's big-eared, and Western red bats.

CEQA Considerations

Refer to the Alternative A discussion. Construction activities have the potential to disturb roosting and foraging bats and decrease localized abundance of prey items, but construction impacts would be temporary, would not have a substantial adverse effect on special-status bat species, and would be less than significant. If tree removal were to injure or kill a roosting special-status bat, impacts would be potentially significant. However, implementation of the bat protection measures listed below would reduce impacts to less than significant. Cattle grazing practices are anticipated to have no impact on special-status bat species, and in the long-term meadow restoration would have a beneficial effect on these species.

Avoidance, Minimization, and/or Mitigation Measures

- Prior to removal of trees and disturbance of the designated upland borrow sites the area would be surveyed by a Forest Service approved biologist for roosting bats. If bats are detected, steps would be taken to minimize disturbance effects and protect identified roosting sites such as establishing appropriate buffers around the roost site(s) to avoid abandonment of the roost(s). Size of buffers shall depend on the species, roost location, and specific construction activities to be performed in the vicinity. If construction activities are conducted during the maternity season (April 15-August

31) and maternity roosts are identified during surveys, no project activity shall commence within the buffer areas until the end of the pupping season or until a qualified biologist confirms the maternity roost is no longer active.

- All removal of trees that provide suitable bat roosting (such as trees with deep bark crevices, snags, or holes) shall be conducted between August 31 and October 30, or earlier than October 30 if evening temperatures fall below 45 degrees Fahrenheit and/or more than a half inch of rainfall occurs within 24 hours. These dates correspond to the time period when bats would not be caring for non-volant young and have not yet entered torpor.

Alternative B – No Action

The No Action alternative would result in no direct change in existing conditions and trends within the proposed project area. Restoration to improve riparian and aquatic habitats for wildlife species within the area would not occur. Gullied stream banks would continue to erode, resulting in the continued loss of the quality and quantity of riparian and aquatic habitats. This continued degradation would preclude the potential for long-term benefits to special-status species and their habitats. Implementation of the No Action alternative for the Thompson Meadow Restoration and Water Budget Evaluation Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for all special-status species addressed in this section, with the exception of the bald eagle. Based on the lack of suitable habitat and eagle occupancy within the proposed project area, the No Action alternative would not affect the bald eagle.

Compliance with the Forest Plan and Other Direction

Analysis of potential effects of the proposed project to special-status animals is in compliance with the Forest Plan. The analysis includes determining potential effects to MIS and USFS sensitive species and minimizing or avoiding species-specific effects through appropriate design and construction measures.

4.2.4. Biological Resources – Plant Species

Regulatory Setting

The USFWS, NMFS, and CDFW are also responsible for implementing laws that regulate impacts to plant species, including FESA and CESA. Laws that pertain specifically to the conservation, protection, and management of plant species include the Federal Noxious Weed Act of January 3, 1975; Executive Order (EO) 11990 Protection of Wetlands; and the Native Plant Protection Act (CDFW Code Section 1900 et seq.).

Plant species considered include those that have been formally listed, are proposed as endangered or threatened, or are candidates for such listing under FESA or CESA. These Acts afford protection to both listed and proposed species. In addition, CDFW Special Vascular Plants, Bryophytes and Lichens, USFWS sensitive species, and USFS sensitive and watchlist species are all considered special-status species. Although some of the CDFW Special Vascular Plants, Bryophytes and Lichens generally have no special legal status, they are given special consideration under CEQA. Plant species on the California Native Plant Society (CNPS) Lists 1 and 2 are also considered special-status plant species. CNPS List 3 and 4 plants have little or no protection under CEQA, but are frequently on USFS watchlists and included in this analysis.

A USFWS plant species list for Plumas County, in which the proposed project area is located, was accessed from the USFWS website in May 2018 and incorporates the database update of April 2018 (USDI 2018). This list fulfills the requirements to provide a current species list pursuant to Section 7(c) of the Endangered Species Act, as amended. In addition, the following sources were reviewed to determine special-status plant species that occur in the vicinity of the proposed project area:

- CNDDB (CDFW 2018)

- CNPS Electronic Inventory records (CNPS 2018)
- PNF Sensitive Species List (USNFS 2014)

The search resulted in a list of 133 plant species. Given the large area of PNF and the variety of existing habitats, many of the species returned from the databases and literature search do not have the potential to occur in the project area because their habitat is not present. The entire Thompson Valley meadow and adjacent slopes (~ 75 acres) were surveyed by DWR Environmental Scientists/Botanists in the years 2006-2009. Studies included a rare plant survey (2016 only), species composition, analysis and mapping of vegetation types, and range forage biomass. In 2018, Butterfly Botanical conducted a floristic survey of the entire proposed project area, with focus on rare, sensitive, and noxious weed species and their typical habitats.

No federal or State endangered plant species are known to occur on PNF. Two federally threatened species, Layne's ragwort (Packera [Senecio] layneae) and Webber's ivesia (Ivesia webberi), are known to occur in and around the Plumas National Forest. The nearest occurrence of Layne's ragwort and its closest designated critical habitat unit are over 50 air miles to the southwest of the proposed project area. The closest known population of Webber's ivesia to the proposed project area is approximately 14 air miles to the southeast on private lands. Habitat for Layne's ragwort and Webber's ivesia are not present in the proposed project area. An additional species of federal concern that has the potential to occur on PNF is the federally threatened Orcuttia tenuis (slender Orcutt grass). Based on field surveys of the proposed project area, no suitable habitat for this species occurs within the project area. In addition, no plants were found during field surveys. Therefore, no threatened or endangered plant species occur within the proposed project area.

Affected Environment

Special-Status Plants

All 133 special-status plant species identified for this analysis are listed in the BA/BE of Rare and Sensitive Plants for the Thompson Meadow Restoration & Water Budget Evaluation Project (USDA 2019e). Fifty-two of the 133 plant species identified as occurring in Plumas County are on the PNF list of Sensitive Plant Species; 76 of the species are federal, State, or CNPS List 1 or 2 species, and are therefore evaluated under CEQA; and the remainder of the plants are on other lists including the PNF "Watch List" and CNPS Lists 3 and 4. These latter categories are not directly protected by NEPA or CEQA; however, they are included in this analysis for completeness. Based on habitat types present and known species' ranges it was determined that seven special-status species had high potential to occur in the proposed project area. These seven special-status plant species are described below.

Lens-pod milk vetch

Lens-pod milk vetch (Astragalus lentiformis) is a CNPS List 1B and PNF sensitive species. A perennial herb in the Fabaceae (pea) family, this species occurs in Great Basin scrub and lower montane coniferous forest habitats in Plumas County. The species is known primarily from shallow, volcanic soils among sagebrush and sometimes with Jeffrey pine. This species blooms from May to July and is found between 4,790 to 6,266 feet elevation. Although not detected during surveys, Great Basin scrub and the isolated Jeffrey pine stands in the proposed project area may provide potential habitat for this species, especially given it is known to occur just outside of the project area to the north and along Forest Road 25N05 less than ½ mile from the existing access road to Thompson Meadow.

Modoc Plateau milk vetch

Modoc Plateau milk vetch (Astragalus pulsiferae var. coronensis) is a CNPS List 4.2 and PNF sensitive species. Modoc Plateau milk-vetch is a perennial herb in the Fabaceae (pea) family that occurs in Great Basin scrub, lower montane coniferous forest, and Pinyon/Juniper woodland habitats in the northern Sierra Nevada and Modoc Plateau including Plumas County. This species blooms from May to July and is found between 4,412 to 6,200 feet elevation. This species was not detected during botanical surveys of

the proposed project area; however, Great Basin scrub habitat may provide potential habitat for this species in the proposed project area. The closest documented occurrence of Modoc Plateau milk vetch to the proposed project area is approximately 4 miles northeast of Thompson Valley.

Pulsifer's milk-vetch

Pulsifer's milk-vetch (Astragalus pulsiferae var. pulsiferae) is a CNPS List 1B and PNF sensitive species. Pulsifer's milk-vetch is a perennial herb in the Fabaceae (pea) family that occurs in Great Basin scrub, lower montane coniferous forest, and Pinyon/Juniper woodland habitats in the northern Sierra Nevada and Modoc Plateau including Plumas County. This species blooms from May to August and is found between 4,265 to 5,906 feet elevation. Great Basin scrub habitat may provide potential habitat for this species in the proposed project area. Although not uncommon in the northern Sierra Valley and documented to occur only three miles to the south, this species has not been documented in the proposed project area or from the valleys and mountains north of Sierra Valley in areas similar to the proposed project area.

Sheldon's sedge

Sheldon's sedge (Carex sheldonii) is a CNPS List 2 species. This species is a rhizomatous herb that grows in lower montane coniferous forest, marshes and swamps, riparian scrub, along creeks and in wet meadows. This species blooms from May to August and is found between 3,494 to 5,758 feet elevation. Lower montane coniferous forest, wet meadow and creek habitats within the proposed project area may provide suitable potential habitat for this species. Known occurrences of this species are located less than 2 miles to the south of the proposed project area.

Sierra Valley ivesia

Sierra Valley ivesia (Ivesia aperta var. aperta) is a CNPS List 1B and PNF sensitive species. Sierra Valley ivesia is a perennial herb in the Rosaceae (Rose) family. The species is found in a variety of vernally mesic habitats with volcanic soils including Great Basin scrub, lower montane coniferous forest, meadows and seeps, pinyon and juniper woodland, and vernal pools. The species typically blooms from June to September and is found between 4,856 to 7,546 feet elevation. Great Basin scrub and meadow habitat in the proposed project area has potential to support this species.

Plumas ivesia

Plumas ivesia (Ivesia sericoleuca) is CNPS List 1B and PNF sensitive species. Plumas ivesia is a perennial herb in the Roasaceae (Rose) family. The species is known from Lassen, Nevada, Sierra, Placer, and Plumas Counties in California and is found in Great Basin scrub, lower montane coniferous forest, meadows and seeps, and vernal pool habitat with mesic and typically volcanic soil substrates. Plumas ivesia typically blooms from May to October and is found between 4,806 to 7,218 feet elevation. Great Basin scrub, meadows, and seep habitat in the proposed project area has potential to support this species.

Sticky pyrrocoma

Sticky pyrrocoma (Pyrrocoma lucida) is a CNPS List 1B and PNF sensitive species. Sticky pyrrocoma is a perennial herb in the Asteraceae (sunflower) family. The species is known from Lassen, Plumas, Sierra, and Yuba Counties in California and is found in Great Basin scrub, lower montane coniferous forest, meadows, and seep habitat with alkaline clay soil. Sticky pyrrocoma typically blooms from May to October and is found between 4,806 to 7,218 feet elevation. Great Basin scrub, meadows, and seep habitat in the proposed project area have some potential to support this species, but alkaline clay soils are not common.

Natural Communities

CDFW and CNPS developed a statewide standard classification system for floristically describing vegetation communities, also known as 'natural communities', that is compiled in "A Manual of

California Vegetation" (MCV), Second Edition (Sawyer et al. 2009). The MCV classifications assist in defining vegetation based on quantitative-based rules to distinguish between vegetation community types, local variation, ecological land classification/composition, species rarity and significance, and historical and current land management practices (Sawyer et al. 2009). The MCV defines vegetation communities by dominant and/or co-dominant species present as: 1A) alliance – a broad unit of vegetation with discernible and related characteristics; 1B) provisional alliance- a temporary vegetation community and/or candidate alliance; and/or 2) association – a basic secondary unit of classification, not as broad as an alliance, with uniform composition and conditions. Natural communities are assigned global and state rarity ranks for plant and animal species. Natural Communities with ranks of S1 – S3 are considered Sensitive Natural Communities to be addressed in the environmental review processes of CEQA and its equivalents. Of the six Natural Communities found within the proposed project area, only one (*Artemisia cana* Alliance) is ranked as a Sensitive Natural Community, and one Natural Community is dominated by invasive annual grass species. Table 4 below shows the Natural Communities identified within the proposed project area, their respective State rarity rank, approximate acreage within the proposed project area, and corresponding CWHR habitat type. A detailed description of the CWHR habitats found in and around the proposed project area can be found in the Thompson Meadow Restoration and Water Budget Evaluation Project Aquatic and Terrestrial Wildlife Species BE and MIS reports.

Table 4. Natural Community Vegetation Alliances occurring within the Proposed Project Area.

Natural Community Alliance	State Rarity Rank[1]	Proposed Project Area Acres	Corresponding CWHR Habitat
Pinus jeffreyi	S4	17.85	Jeffrey pine
Artemisia arbuscula ssp *arbuscula*	S4	7.13	Sagebrush
Artemisia cana[2]	S3	11.27	Sagebrush
Artemisia tridentata	S5	28.10	Sagebrush
Bromus tectorum- Taeniatherum caput-medusae	SNR[3]	0.48	Annual grassland
Carex nebrascensis	S4	4.63	Wet meadow

[1] Natural Communities with ranks of S1-S3 are considered Sensitive Natural Communities to be addressed in the environmental review processes of CEQA and its equivalents.
[2]*Artemisia cana* Alliance is considered a Sensitive Natural Community (Sawyer et al. 2009).
[3]A California State Rarity Ranking of 'SNR' means that no ranking has yet been established.

Pinus jeffreyi (Jeffrey Pine) Alliance

The forested uplands of the proposed project area are dominated by *Pinus jeffreyi* with greater than 50 percent relative cover in the tree canopy, and a minor component of *Pinus ponderosa* and *Juniperus occidentalis* var. *australis.* This vegetation alliance occurs on the fringes of the meadow and is the primary vegetation type along the access road and in the upland borrow sites. Canopy closures are estimated at greater than or equal to 60 percent with average DBH of 10 to 12 inches. Forested habitat is interspersed with small openings of sagebrush, rocky outcrops, and dry barren slopes. The corresponding CWHR habitat types are eastside pine and Jeffrey pine.

Artemisia arbuscula var. arbuscula (Little sagebrush scrub) Alliance

This alliance is defined by *A. arbuscula* ssp. *arbuscula* being dominant or co-dominant in the shrub canopy with greater than 30 percent relative cover in the shrub canopy. In the proposed project area, this vegetation alliance is found in patches ranging from less than 0.5 to 3.5 acres that are dispersed in

the southeast and northwest portions of the project area meadow, but is not found in the road access or borrow site portions of the project area. The corresponding CWHR habitat type is sagebrush.

Artemisia cana (Silver sagebrush) Alliance

This alliance is defined by *A.cana* being dominant and greater than 15 percent absolute cover in the shrub canopy. It is ranked S3 and is considered a Sensitive Natural Community. This vegetation alliance totals 11.27 acres and is dispersed throughout the meadow portion of the proposed project area, but is not found in the road access or borrow site portions. The corresponding CWHR habitat type is sagebrush.

Artemisia tridentata (Big sagebrush) Alliance

This alliance is defined by *A.tridentata* being dominant or co-dominant in the shrub canopy with greater than 2 percent absolute cover and no other single shrub species with greater cover. The corresponding CWHR habitat type is sagebrush. This vegetation alliance dominates the higher, drier parts of the proposed project area meadow and the sloping hillsides on the edge of the meadow.

Bromus tectorum-Taeniatherum caput-medusae (Cheatgrass- medusahead grassland) Semi-natural Alliance

This alliance is designated as 'semi-natural' and therefore does not receive a ranking under the MCV classification. The community is dominated by non-native species. *Bromus tectorum* and/or *Taeniatherum caput-medusae* are dominant or co-dominant with other non-natives in the herbaceous layer. Emergent shrubs may be present at low cover. The rule for inclusion for this alliance is greater than 30% relative cover of *B. tectorum* in the herbaceous layer. The corresponding CWHR habitat type is annual grassland.

Approximately 0.5 acre of this Semi-natural Alliance type is found along the southeast edge of the proposed project area meadow, and as a small patch where the existing access road meets the meadow. This alliance occurs only as *B. tectorum* (no *T. caput-medusae*). In more recent years, *B. tectorum* has been observed spreading significantly in drier disturbed areas in the northern end of the meadow.

Invasive Plant Species

Only eight plant species were identified as non-native in the several florisic surveys conducted in the proposed project area from 2006 – 2018 (USDA 2019e), and none of the eight species are listed on the California Department of Food and Agriculture's (CDFA) Noxious Weed List, USDA Federal Noxious Weed List, or PNF Invasive Plant List. One species, B. tectorum (cheatgrass), is rated 'High' by the California Invasive Plant Species Council due to its potential negative impact to native plant communities and its effect on the timing, frequency, and impacts of wildfire. Cheatgrass has been identified in several locations within the proposed project area (USDA 2019e) and has been slowly spreading as the meadow trends toward drier conditions.

Environmental Consequences

Potential direct effects from the proposed project include trampling of plants by construction workers and equipment, burying plants when placing fill in portions of the channel, and removing trees from the upland borrow sites. Although the proposed project would affect 0.68 mile of mainstem gully, 0.1 mile of downcut tributaries, and 0.8 acre of meadow (meadow borrow site), no special-status or CNPS List 1 or 2 plant species were found in these areas. Additionally, no special-status or CNPS List 1 or 2 plant species were found in the proposed project area. The presence of potential habitat in the upland borrow sites and the close proximity of known populations of *A. lentiformis* (lens-pod milk vetch) suggests this plant has a high potential to occur within the proposed project area, but no plants were observed during the 2018 floristic survey. Should *A. lentiformis* be found in the proposed project area

during implementation, adherence to the protection measures listed below (see 'CEQA Considerations') would avoid or minimize disturbance of the population.

Potential indirect effects from the proposed project include submerging or waterlogging plant roots by restoring the water table elevation and potentially introducing competitive noxious weed species. Restoring the water table elevation would likely covert drier site-specific plant species, such as sage, to wetter site-specific plant species, such as sedge, on the meadow floodplain. This would not result in any impacts to special-status plant species as none occur within the proposed project area. A noxious weed impact analysis was conducted and is included in the Rare and Sensitive Plant BA/BE for the Thompson Meadow Restoration & Water Budget Evaluation Project (USDA 2019e). No noxious weed species on the USDA or CDFA noxious weed lists were observed in the proposed project area. Due to the absence of special-status plant species in the proposed project area, no indirect effects to such species are anticipated from implementation of the proposed project. Because no direct or indirect effects are anticipated, no cumulative effects to special-status plants would occur.

Only one CDFW Sensitive Natural Community, the Artemisia cana Alliance, occurs in the proposed project area and covers 11.27 acres of the meadow area. Table 5 summarizes the impacts to natural communities that would occur from implementation of the proposed project. Of the 11.27 acres, only 0.07 acre (less than one percent) of the Artemisia cana Alliance is anticipated to be permanently affected by the construction of the rock riffle structures. Another 0.39 acre (3.5 percent) would be temporarily affected during construction of the fence. Though one of the rarer sagebrush alliances in the State, stands are common in the Sierra Nevada on eastern slopes in riparian areas and the proposed project is unlikely to have a substantial adverse effect on the existing areal extent of this alliance.

Table 5. Anticipated impacts to Natural Community Vegetation Alliances within the Proposed Project Area.

Alliance type	Habitat within Proposed Project Area	Permanent impacts (ac)	Percent of alliance permanently impacted (%)	Temporary impacts (ac)	Percent of alliance temporarily impacted (%)
Pinus jeffreyi	17.85	Approx. 3	17	10	56
Artemisia arbuscula ssp *arbuscula*	7.13	0	0	0.6	8
***Artemisia cana*[1]**	**11.27**	**0.07**	**0.6**	**0.39**	**3**
Artemisia tridentata	28.10	2.86	10	1.72	6
Bromus tectorum-Taeniatherum caput-medusae	0.48	0	0	0.43	90
Carex nebraskensis	4.63	0	0	0.1	2
Project Totals	69.46	5.93	NA	13.24	NA

[1]Bolding indicates designation as a Sensitive Natural Community.

Implementation of the proposed project would result in a permanent decrease in acreage of three Artemisia-dominated alliances and a consequent net loss of the Great Basin scrub habitat in the proposed project area. This loss would occur directly during project construction and indirectly as plant

communities change over time in response to the altered meadow hydrology. However, Great Basin scrub habitat became prevalent in the project area as a result of the downcutting and gullying of the stream channel through the meadow in recent history. The channel downcutting effectively lowered the water table and caused a change from wetter meadow habitat types to drier scrub habitat types adjacent to the main creek channel. Therefore, proposed restoration would return the habitat assemblage of the project area to a more natural state that occurred before the downcutting of the stream. Overall habitat quality of the proposed project area would increase as a more natural hydrologic regime is restored to the meadow.

Alternative A – Proposed Project (Federal Action)

No threatened, endangered, or candidate (TEC) plant species would be affected by the proposed project. No TEC species are known to occur in or near the proposed project area, nor does the project area support habitat for the federal threatened and candidate species known to occur on PNF. However, the presence of B. tectorum (cheatgrass) in several locations within the proposed project area has the potential to adversely affect native plant communities if allowed to spread beyond its current locations. Adherence to the avoidance, minimization and mitigation measures listed below, combined with post-project monitoring, would prevent spread of existing cheatgrass populations. In addition, the wetter soil conditions that would occur as a result of proposed restoration activities would create growing conditions more favorable to native meadow species. Therefore, there would be no adverse direct, indirect, or cumulative effects to TEC plant species or their habitat with implementation of the proposed project.

No special-status plant species were observed in the proposed project area. While some habitat types that support special-status plant species known from the area, including Great Basin scrub, the Artemisia cana Alliance, and meadow habitat, would be affected by the proposed project, these habitat types are relatively common in the project area and surrounding area and the proposed project would not cause a substantial reduction of these habitat types. The proposed project would restore the area to more natural conditions compared to existing conditions.

CEQA Considerations

Refer to the Alternative A discussion. No TEC or special-status plant species were observed within the project area and impacts to potentially suitable habitat for these species would not result in a substantial reduction of these habitat types. However, if a previously undetected population of a listed or special-status plant species were to be destroyed during proposed construction, impacts would be potentially significant. Implementation of the following avoidance, minimization, and mitigation measures would reduce potential impacts to less than significant.

Avoidance, Minimization, and/or Mitigation Measures

- Construction activities would occur during the dry time of the year when stream flow in Thompson Creek is at its lowest, and reproductive cycles for most plant species have reached the seed dispersal stage, from mid-August through mid-November.
- There would be no livestock use of treated areas within Thompson Meadow for at least two to three years following construction activities. Only after Forest Service approved resource specialists have determined that livestock use would not destabilize project features would livestock be permitted to graze the meadow within the fenced off riparian and adjacent meadow area.
- Appropriate soil fill material for riffles, plugs, grade control structure, and rock apron would be obtained from the closest available source (road modifications, borrow ponds, and meadow borrow site) to minimize travel in the meadow.
- To minimize the footprint and soil disturbance of project activities, all heavy equipment would stay within the confines of the work area, and material transport within the meadow would generally not exceed 300 feet.

- Should any TES plant species be located during project activities, a Forest Service approved botanist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.
- To avoid the proliferation of weeds, all equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter, or other debris that could contain seeds before mobilization onto the Forest. Equipment would also be washed at the staging area to remove weeds prior to demobilizing from the project area. The project area would be monitored for noxious weed invasion for three years after implementation. Any weeds encountered would be hand-removed. Weed monitoring and removal would be conducted by USFS staff and/or contracted help. Treatment of any noxious weeds found during monitoring would be accomplished by PNF.
- Equipment staging areas would be free of invasive species. Known infestations would be identified and avoided during project implementation, or removed before project implementation. West Street from Portola would be avoided as an access route to the project area due to known noxious weed infestations along the roadway.
- New or previously unidentified infestations of noxious weeds that are discovered during project implementation would be documented, mapped with a GPS unit, flagged, and avoided. New sites would be reported to a Forest Service approved botanist.
- To the extent possible, only on-site vegetative material, soil, and sand would be used as described above in the Proposed Action.
- Any materials used for restoration or erosion control (i.e. straw, mulch, gravel, and rock material) would be from local sources and weed-free. Rock material collected from the Forest Service Crocker Pit would be verified weed-free by a Forest Service approved botanist prior to rock removal. If it is necessary to use commercially-obtained material, a certificate stating the material was inspected and is weed-free would be required.
- Areas of bare ground would be replanted with existing transplanted vegetation (i.e. sedge mats), willow cuttings, and an appropriate mix of native species developed by a Forest Service approved botanist.

Alternative B – No Action

The No Action alternative would result in no direct change in existing conditions and trends within the proposed project area. Restoration to improve wet meadow and riparian vegetation within the area would not occur. Gullied stream banks would continue to erode, resulting in the continued loss of the quality and quantity of riparian and wet meadow plants and the likely spread of non-native species such as B. tectorum. This continued degradation would likely result in an expansion of Great Basin scrub and the Artemisia cana Alliance in the meadow over time.

Compliance with the Forest Plan and Other Direction

Analysis of potential effects of the proposed project to special status plants is in compliance with the Forest Plan. The analysis includes determining potential effects to USFS sensitive species.

4.2.5. Biological Resources – Wetlands and Other Waters of the United States

Regulatory Setting

Section 404 of the Clean Water Act (CWA) serves as the primary federal law protecting the quality of the nation's surface waters, including wetlands. Under section 404, USACE and the USEPA regulate the discharge of dredged and fill materials into the waters of the United States. These waters are defined as navigable waterways or water features (including wetlands) that have a significant nexus to navigable

waters. Authorization must be obtained from USACE for all discharges of dredged or fill materials into waters of the United States before proceeding with a proposed activity.

Affected Environment

Plumas Corporation conducted a formal delineation of wetlands and other waters of the United States that may be regulated by USACE under the CWA Section 404. Delineation occurred within the 66.35-acre project area that may be subject to ground disturbance during proposed construction activities. Delineation of aquatic features was conducted in accordance with the 1987 USACE Wetland Delineation Manual and Arid West Regional Supplement. Site visits were conducted on June 16, 2017, and May 14, 2018, to assess the wetland status and potential USACE jurisdictional authority over portions of the meadow and upland borrow sites, respectively. Research and field investigation resulted in the delineation of 16.36 acres of potential waters of the United States, which includes 9.59 acres of riparian wetlands within the meadow and 6.77 acres of other waters (riverine) in the channels. The majority of the meadow floodplain area does not have hydric soils.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

Proposed restoration activities would restore the meadow hydrology and are anticipated to result in an increase of riparian wetlands from 9.59 acres to 23.03 acres and a slight decrease of riverine from 6.77 acres to 2.59 acres. Riverine acreage would decrease because the wide width of the existing gully bottom (which, using the ordinary high water mark, was included in riverine width) would be replaced with the more narrow width of the remnant channel (proposed channel) on the meadow surface. The purpose of the proposed project is to prevent further degradation of the stream and meadow system along Thompson Creek in order to improve flow conditions, meadow productivity, vegetative cover, and water quality. The proposed project seeks to improve these conditions by restoring the meadow hydrology and re-connecting the channel to the floodplain, so that overbank flows can access the floodplain every 1-2 years. It is expected that the restored hydrology would improve the vigor and extent of wet/moist meadow plant communities and improve the quality and quality of riparian vegetation communities. The conversion of riverine habitat to riparian wetland habitat and increase in wetland habitat due to the restored meadow hydrology would result in an overall increase in potential waters of the United States. Changes in grazing practices post-project would limit grazing in wetland areas.

CEQA Considerations

Implementation of the proposed project would restore the meadow hydrology in the project area and result in a slight decrease in riverine habitat, but the decrease would occur from conversion to riparian wetland habitat and result in no net loss of water of the United States, which would be a less than significant impact. Restored meadow hydrology is anticipated to increase riparian wetland habitat, which would have a beneficial effect. Changes in grazing practices would also result in a beneficial effect.

Alternative B – No Action

The No Action alternative would result in no direct change in existing conditions and trends within the proposed project area. Restoration to improve wet meadow and riparian vegetation within the area would not occur. Gullied stream banks would continue to erode, resulting in the continued loss of the quality and quantity of riparian wetlands and wet meadow habitat and degradation of riverine habitat.

Compliance with the Forest Plan and Other Direction

Analysis of potential effects of the proposed project to wetlands and other waters is in compliance with the Forest Plan and Section 404 CWA laws.

4.2.6. Cultural Resources

Regulatory Setting

The proposed project is located within National Forest System Lands administered by PNF. As such, any proposed activity that meets the definition of undertaking as per 36 CFR 800.16 must comply with Section 106 of the NHPA of 1966, as amended. As per Section 106, and its implementing regulations found within 36 CFR 800, federal agencies are required to take into account the effects of their undertakings on historic properties and allow the Advisory Council on Historic Preservation the opportunity to comment prior to a federal agency's final decision to proceed. Historic properties are cultural resources defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the National Register of Historic Places (NRHP). Furthermore, cultural resources not yet evaluated for inclusion to the NRHP are treated as potentially significant and afforded the same level of consideration until such time as they are determined to be ineligible for listing (see Forest Service Manual part 2363.22). Cultural resources can include archaeological resources from the ancient past (prehistory), historic era tribal resources, Traditional Cultural Properties and sacred sites, historic era archaeological resources and historic era structures (e.g. bridges, roads and buildings).

The Plumas National Forest complies with Section 106 of the NHPA by complying with the *First Amended Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region* (USDA 2018). The PA provides an alternative and streamlined process for compliance with Section 106 for undertakings that will result in No Effect or No Adverse Effect findings to historic properties. The PA includes screened undertaking provisions, provides approved standard protection measures, and selective expedited NRHP evaluation procedures which, when appropriately applied, do not require case-by-case consultation with the California State Historic Preservation Officer (SHPO).

Both Section 9 of the Archaeological Resources Protection Act and Section 304(a) of the NHPA provides for the withholding of information concerning the location and character of archaeological resources if such disclosure may risk harm to such properties. Accordingly, specific information regarding archaeological resources within or in proximity to the Thompson Meadow Restoration Project area of potential effects remains confidential. A Section 106 compliance report is incorporated by reference that was prepared for the purposes of this undertaking addressing identification efforts, evaluation of NRHP significance, and finding of effects in consultation with Indian tribes and the SHPO (USDA 2018b).

As per the PA, and as required within 36 CFR 800.2(c), the Plumas National Forest initiated consultation with federally recognized Indian tribes, local Native American organizations, and other interested parties regarding potential effects to historic properties for the project (see Public Involvement and Tribal Consultation, page 17-18). Tribal consultation included sharing details on the purpose and need for the proposed project as well as potential adverse effects to historic properties. Consultation will be ongoing throughout implementation of the project. A tribal monitor will be invited to be present during project activities in proximity to any historic properties.

CEQA as well as California Public Resources Code (PRC) Section 5024 and PRC 21080.3.1(d) apply to State-owned resources and State-sponsored projects. While the lands within and surrounding the project are administered by the Forest Service, a federal agency, it is partly sponsored by a State agency (State of California – Department of Water Resources). Cultural resources are, therefore, also considered under CEQA and PRC Section 5024.1. CEQA establishes the California Register of Historical Resources whose criteria for determining historic significance mirror that of the NRHP (36 CFR 60.4).

Pursuant to PRC 21080.3.1(d), prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project, the CEQA lead agency shall begin consultation with a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project if the California Native American tribe requested to the lead agency, in writing, to be informed by the lead agency through formal notification of proposed projects in the geographic area that is traditionally and culturally affiliated with the tribe. No requests pursuant to PRC 21080.3.1(d) for formal notification of proposed projects that occur in the vicinity of the project area have been received by DWR.

Both the California Natural Resources Agency (CNRA) and DWR (which is part of the Natural Resources Agency), have policies that address Executive Order B10-11 (B10-11), which establishes that every state agency and department subject to executive control shall encourage communication and consultation with California Native American tribes. On January 31, 2018, pursuant to the CNRA and DWR tribal engagement policies, DWR mailed letters of invitation for tribal engagement to the Greenville Rancheria, Susanville Indian Rancheria, and Washoe Tribe of California and Nevada. No requests for engagement were received by DWR.

Affected Environment

The 314 acre area of potential effects (APE) for the undertaking was defined as per the PA and includes the total proposed project area and the boundaries of all historic properties that could potentially be affected by the proposed project. The 64.3 acre area of direct impact (ADI) is defined as the specific project construction areas, access routes, and monitoring locations, as well as the areas that will experience an increase in water retention as a result of implementing the project.

The project APE and surrounding areas are highly sensitive for prehistoric cultural resources. The Plumas National Forest conducted intensive cultural resource inventory for the purposes of the proposed project. Three prehistoric archaeological sites were identified within the APE. Two sites were determined eligible for inclusion in the NRHP in 2019. The third prehistoric site remains unevaluated and will be treated as potential eligible for listing. A fourth archaeological site is the linear remains of the historic Clover Valley Lumber Company (CVLC) railroad logging system. The CVLC logging railroad was found to be eligible for inclusion in the NRHP in 2011.

Two prehistoric sites were found to extend slightly into the project ADI. Intensive archaeological assessment of these small areas did not reveal significant occurrences of cultural artifacts and features. No Traditional Cultural Properties, sacred sites, or places of religious significance were specifically identified through research or through tribal consultation within or nearby the project APE.

It is believed the proposed project area was historically shared by both the Washoe and Maidu tribes. Consultation with the Maidu and Washoe tribes confirmed the importance of the proposed project area and cultural resource sites identified in the Cultural Resources section to both tribal communities. Washoe tribal representatives visited the proposed project area on July 18, 2017. Of greatest concern was protection of areas with concentrations of artifacts. The Washoe THPO deferred to the Maidu for direct tribal involvement and recommendations and requested that an archaeological or tribal monitor be on site during project implementation. Maidu tribal representatives visited the proposed project site on September 13, 2017. Maidu tribal representatives concurred that a Maidu Tribal Monitor was desired to be present during project implementation.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

To what extent accelerated seasonal flood flows currently confined to incised channels have impacted cultural resources, there can be little doubt that a significant degree of erosion has been experienced in this area over the last 150 years, and that such events have resulted in at least some loss or

displacement of cultural material. The successful completion of the project would result in stabilization of the meadow/channel system thereby alleviating destructive erosion. In addition, the restoration of groundwater levels to historic conditions would return riparian species and geomorphology to conditions closer to what was likely present prior to Euro-American settlement. This would likely create an environmental setting that is closer to conditions that would have been present in the ancient past. All activities associated with the construction and monitoring of the project will completely avoid the old railroad grade. The anticipated increase in water retention as a result of implementing the project will also not adversely impact the railroad grade or any of the prehistoric sites in the APE.

Archaeological resources would be protected from impact with the exception of two very small locations along the existing channel and the slight modification and use of an access road. In both cases, the impact was determined to be minimal. In addition, an existing road was approved for slight modification and use through a site boundary that will have no adverse effect on cultural resources. All locations within the ADI would be closely monitored by a qualified Forest Service approved archaeologist and a Maidu tribal monitor during project implementation. If any unexpected cultural materials or features are exposed, all work will cease in the area pending an examination by a Forest Service approved archaeologists and/or the Maidu tribal monitor. Standard protection measures outlined in Appendix E of the PA will be applied as needed within the APE including avoidance, utilization of buffer zones, and boundary delineation (e.g. flagging, staking or protective temporary fencing). No project activities will be allowed outside the designated ADI. As per 36 CFR 800.5(d)(1), the SHPO concurred with the Plumas National Forest's finding of no adverse effect to historic properties for the proposed Thompson Meadow Restoration Project on May 6, 2019 fulfilling the agency's responsibilities under Section 106 (SHPO 2019, USFS_2019_0405_002).

CEQA Considerations

Refer to the Alternative A discussion. Implementation of the proposed project would not adversely change historical or archaeological resources and is not anticipated to disturb human remains. Impacts to cultural resources would be less than significant and would be further reduced with the implementation of the below avoidance, minimization and mitigation measures; all of which are standard protection measures outlined within the PA cited above.

Avoidance, Minimization, and/or Mitigation Measures

- Standard Forest protection measures including flagging and avoiding the portions of the sites outside of the ADI will be implemented.
- If unanticipated cultural resource materials are discovered during construction, all earth-moving activity within and around the immediate discovery area would cease until a qualified archaeologist can assess the nature and significance of the find.
- A Maidu Tribal Monitor and a qualified Forest Service approved archaeologist will be present during project implementation in proximity to two culturally significant sites that are within and adjacent to the project area.
- If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to PRC Section 5097.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC) who will then notify the Most Likely Descendent (MLD). Further provisions of PRC5097.98 are to be followed as applicable. The Plumas National Forest operates under a Forest specific Native American Graves and Repatriation Act (NAGRPA) protocol (2017) that will be utilized to immediately inform and engage Indian Tribes in the event of the discovery of Native American human remains or associated items outlined within NAGPRA, i.e. funerary objects, sacred objects and objects of cultural patrimony.

Alternative B – No Action

Under the no action alternative there would be no effect to cultural resources as a result of constructing or maintaining the proposed project. The possibility of additional erosion resulting in damage to cultural resources would continue dependent upon the frequency and severity of flooding events within the currently incised channels.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with the Forest Plan and complies with all federal requirements for protection and management of cultural resources including Section 106 of the NHPA as discussed above.

4.2.7. Geology and Soils/ Hydrology and Water Quality

Regulatory Setting

The National Forest Management Act (NFMA) of 1976, as described in Forest Service Manual Chapter 2550, requires the maintenance of productivity and protection of the land and, where appropriate, the improvement of the quality of soil and water resources. NFMA specifies that substantial and permanent impairment of productivity must be avoided. Forest Service Manual 2550 (USDA 2010b) establishes the management framework for sustaining soil quality and hydrologic function while providing goods and services outlined in Forest land and resource management plans. Primary objectives of this framework are to inform managers of the effects of land management activities on soil quality and to determine if adjustments to activities and practices are necessary to sustain and restore soil quality. Soil quality analysis and monitoring processes are to be used to determine if soil quality conditions and objectives have been achieved. Soil management standards and guidelines are not applied to administrative sites or dedicated use areas such as roads and campgrounds.

The Forest Service has two directives for soil management guidance, the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012a) and the Pacific Southwest Region (Region 5) Supplement No. 2500-2012-1 for Soil Management (USDA 2012b). The Region 5 Supplement outlines soil functions and indicators that are to be used to determine if national soil quality objectives are met for the project. Soil functions include: 1) Support for Plant Growth: with indicators of soil stability, surface organic matter, soil strength, and soil moisture regime 2) Soil Hydrologic Function: with indicators of soil stability, and soil structure and macro-porosity 3) Filtering-Buffering Function.

Federal regulations pertaining to water quality are outlined in the 1948 Clean Water Act (CWA), as amended in 1972 and 1987. The CWA establishes as federal policy the control of both point and non-point source pollution and assigns to the states the primary responsibility for control of water pollution. In response to this law, the USFS has developed BMPs in coordination with the SWRCB, with BMPs certified by the USEPA.

Non-point source pollution on PNF has been managed for the past 19 years through the water quality management program contained in Water Quality Management for Forest System Lands in California (USDA, 2000). The BMPs contained in that document have recently been improved and replaced by the BMPs presented in a Region 5 Amendment to the Forest Service Handbook (USDA, 2011a) and in a National Forest Service BMP manual, National Best Management Practices for Water Quality Management on National Forest System Lands (USDA, 2012b). The 2000 California Water Quality Management Manual contains the 1981 Management Agency Agreement (MAA) between the SWRCB and the USFS (USDA 2000). The SWRCB has designated the USFS as the management agency for all activities on National Forest lands and the MAA constitutes the basis of regional waivers for non-point source pollution.

Section 303(d) of the CWA requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards or are considered impaired. The list of affected water bodies, and associated pollutants or stressors, is provided by the SWRCB and approved by the USEPA. The most current list available is the 2014 and 2016 303(d) list (SWRCB 2018). No water bodies on this list are located within the proposed project area. The nearest downstream water body on the 303(d) list is the North Fork Feather River between Lake Almanor and Lake Oroville. The Red Clover Creek HUC 5 watershed (#1802012203) generally flows northwestward toward its confluence with Last Chance Creek (HUC5#1802012202) and continues to drain into the Lower Indian Creek HUC5 watershed (#1802012204) and eventually into the Lower East Branch North Fork Feather River HUC 5 watershed (#1802012208) before entering the 303(d) listed reach in the Bucks-Grizzly HUC5 watershed (#1802012107). The North Fork Feather River is included on the 2010 303(d) list for PCBs, mercury and water temperature impairments. The proposed project is not expected to impact water temperature nor legacy deposits or concentrations of mercury or PCBs in the North Fork Feather River. The 303(d) list describes hydropower modifications and flow regulation and modification as the potential sources for water temperature impairments.

Beneficial uses identified by the Central Valley Regional Water Quality Control Board (CVRWQCB) are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The USFS is required to protect and enhance existing and potential beneficial uses (CVRWQCB 1998). Beneficial uses of surface water bodies that may be affected by activities on the PNF are listed in Chapter 2 of the Central Valley Region's Water Quality Control Plan (commonly referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (SWRCB, 1998; as amended in 2018), and are described below for the proposed project. The project area drains to the North Fork Feather River, for which existing beneficial uses include municipal and domestic water supply, hydropower generation, recreation, freshwater habitat, habitat suitable for fish reproduction and early development, and wildlife habitat.

Compliance with Section 404 of the Clean Water Act would be assured per the preconstruction notification process required by USACE for nationwide permit 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities). A Section 401 Water Quality Certification from the CVRWQCB would be secured prior to construction. A CDFW permit for lake and streambed alteration may be secured prior to construction if the proposed project is implemented with State funds. A water right application for this project would not be made to the State of California because streambed restoration is not an appropriative use of water, and this streambed restoration project would not divert or store water for a designated beneficial use.

Affected Environment

The geographic region defining the watershed analysis is a sub-watershed that falls within the boundaries of the Lower Red Clover Creek Hydrologic Unit Code (HUC 12) (180201220103) watershed. For soil and watershed resources, the proposed project area is within a 1,783-acre (2.8 sq mi) cumulative effects analysis area, or area of cumulative watershed effects (CWE). The cumulative effects geographic boundary is based on the watershed boundary upstream of the proposed project area and is shown in Figure 4.

The proposed project lies within the 78,000-acre Red Clover Creek HUC 5 watershed, which generally flows northwestward toward its confluence with Last Chance Creek and continues to drain into the Indian Creek HUC 5 watershed and eventually into the East Branch North Fork Feather River HUC 5 watershed. The eastern two-thirds of the Feather River watershed, including Red Clover watershed, occupy a geologic feature called the Diamond Mountains. While abutting the Sierra batholith, the Diamond Mountains are a separate amalgam of meta-volcanic, volcanic and meta-sedimentary formations with granitic intrusions intermixed by tectonic faulting (Durrell, 1988). The Diamond Mountains are much older than the Sierra Nevada. As a consequence, erosional processes coupled with

faulting have resulted in long, extensive alluvial meadow features. Many of these meadows were once lakes as recently as the Pleistocene era.

The Diamond Mountains are also the transition between the moist, temperate west slopes of the Sierra Nevada and the arid Great Basin. The orographic crest of the Sierra Nevada range is approximately 35 air miles west of Red Clover Creek, resulting in a rain-shadow effect, which contributes to an average annual precipitation of 25-30 inches and 8 inches of run-off. The bulk of annual precipitation falls as snow from Pacific frontal systems during the winter (October-May) with a dry summer. Intense thunderstorms occur somewhere in the watershed during the summer every year, which can generate significant local erosional events (Cawley, 1990). Major watershed scale floods are the result of long duration, intense, rain-on-snow, storm events (1955, 1986, 1997, 2017). Drainage patterns in the watershed are defined by geology, including faults and fractures as well as soils and vegetation.

The proposed project area is located at the bottom of a 1,783-acre watershed (the CWE). Elevation in the watershed above the proposed project area peaks at 6,345 feet. Along ridgetops and steep side slopes, boulders and rock outcrops dominate the landscape. Elevation within the project area is 5,650 feet to 5,460 feet. Soil types range from clay to sandy loam in the valley bottom and alluvial fans with gradients between zero and four percent. In a pre-degradation condition, these floodplain and fan soils were stable, anchored by wet or mesic vegetation complexes with deep, dense root systems and excellent infiltration. Streamflow in such a landscape is less “flashy”, only responsive to rainfall and snowmelt events once the soils are saturated. Sediment and nutrients delivered from the upper watershed are filtered, stored, and ultimately incorporated into the meadow soils. The soil types along the access road and upland borrow sites range from cobbly loam to stony loamy sand.

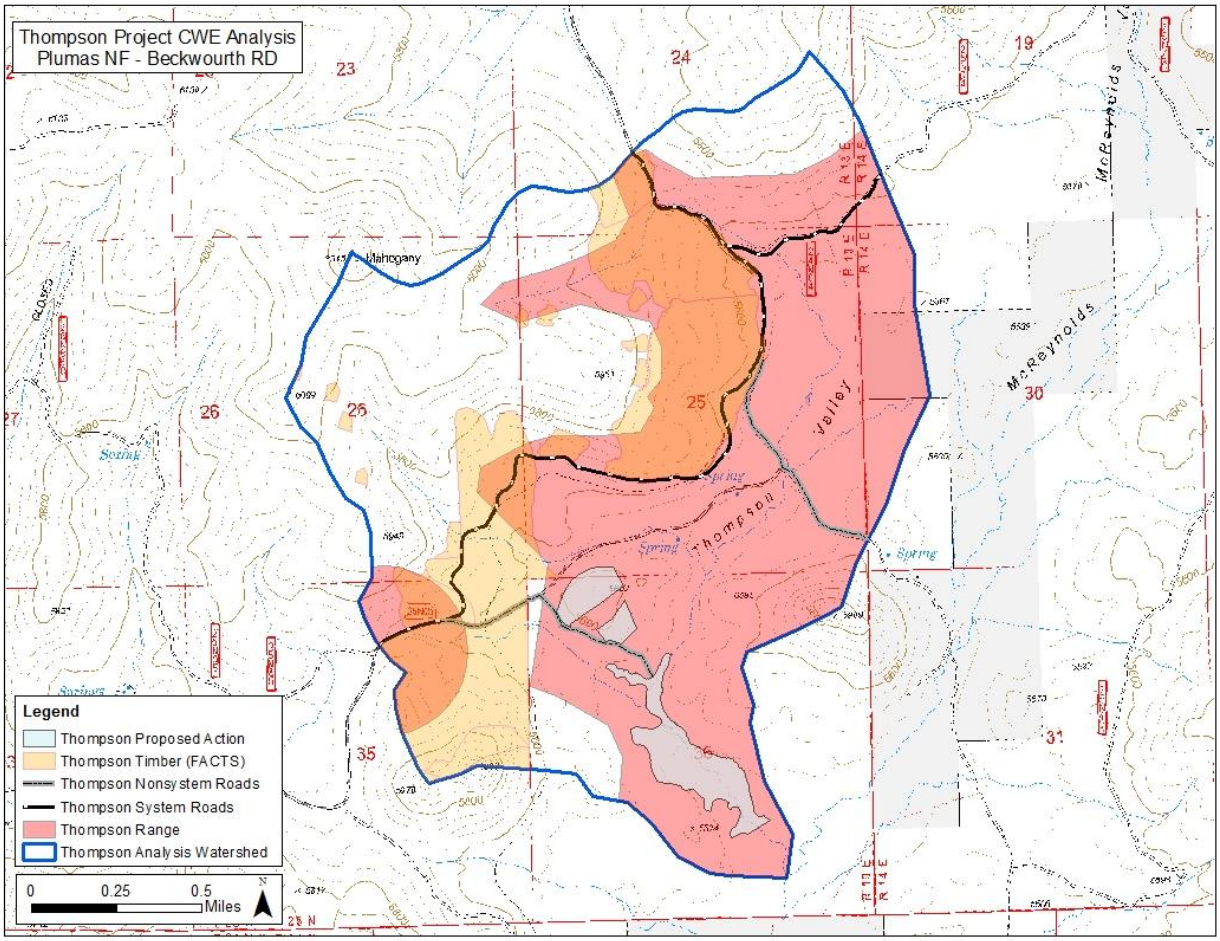

Figure 4. Cumulative Watershed Effects Analysis Area

Since 2012, streamflow through the meadow has been continuously measured (at 15-minute intervals) through the spring and summer months as part of DWR's monitoring and modeling effort. Flow rates are recorded annually for the period from April 1 through November 1. Flow through the summer months is very low, with the maximum daily flow rate for June 1 through September 30 at the downstream gage averaging 0.14 cubic feet per second (cfs) for 2016 (an above normal precipitation year). Flood flows through the project area clearly recede by April 1 each year. The largest flow recorded at the downstream gage between April 1 and November 1 for 2014-2016 is 1.26 cfs (on April 22, 2016). For the design of the proposed project, the maximum 100-year flood flow is estimated to be approximately 275 cfs. These peak flows are expected to be of short duration, rising and falling sharply within 24 hours. Images from a camera located on the main channel near the downstream end of the project indicate that the peak flood flow from January 2017 rose and fell sharply between the morning of January 8 and the morning of January 9 (see Hydrology Report).

Existing Soil Condition

There are 7 soil map units in the project area (Table 6). The Keddie loam and Ramelli silty clay loam are very deep, poorly drained alluvium soils derived from mixed parent materials. They are used for irrigated pasture and rangeland, with the caveat that the poor drainage provides a wetness which limits the plant species that can grow there, as well as the period of grazing. Keddie loam is subject to occasional, brief flooding, and can form channels. Ramelli silty clay loam is subject to frequent flooding and can form channels. These two soil types are dominant in the meadow area of the proposed project area. The incision of the stream channels over the last century has removed the influence of water from these soils, as well as the soil's influence over the hydrology.

The upland borrow areas and access road corridor are dominated by Haypress-Toiyabe families complex. The Haypress family soils are shallow, somewhat excessively drained soils derived from weathered granodiorite, while the Toiyabe family soils are excessively drained, shallow soils derived from weathered quartz-diorite. The remaining four soil types occur in small areas on the periphery of the project area. The Franktown family are well-drained, shallow soils of welded tuff residium weathered from andesite. The Sattley family are well-drained, shallow soils derived from basic volcanic breccia parent material, and the Haypress family is somewhat excessively drained soils of residium derived from granodiorite parent material. Table 6 lists characteristics of soils mapped in the proposed project area based on the Soil Resource Inventory, USDA, PNF, 1988 and the USDA-NRCS Web Soil Survey.

Table 6. Characteristics of soils mapped in the project area (USDA 1988; NRCS Web Soil Survey 2018)

Soil map unit	Soil name	Acres	% of Project area	Flooding Frequency	Productivity	Slope (%)	Erosion Hazard Rating[1]/ Erodibility Factor K[2]	Management Concerns
26	Keddie loam	36.03	54.97	Occasional		2-4	Slight/0.32	Soils are subject to compaction, deep, and poorly drained. Need to minimize equipment footprint' replant all disturbed soil, and time work for the dry season.

34	Ramelli silty clay loam	6.30	9.61	Frequent	2,000 – 4,500 pounds per acre	0-2	Slight/0.32	Soils are deep and poorly drained. Need to replant all disturbed soil and time work for the dry season.
170	Franktown -Fopian families complex	1.64	2.50	None	<20 cubic ft/acre/yr[3]	15-45	Moderate/ 0.05	Soils are subject to compaction.
173	Franktown family-Rubble land complex	0.71	1.08	None	<20 cubic ft/acre/yr	30-70	Not Rated/No data	No data.
174	Franktown -Sattley families complex	1.21	1.85	None	<20 cubic ft/ac/yr (Franktown) 20 – 84 cubic ft/ac/yr (Sattley)	10-50	Moderate/ 0.05	Soils are subject to compaction. Need to minimize equipment or soil disturbing activities and time work for the dry season.
186	Haypress family	1.99	3.04	None	20 – 49 cubic ft/ac/yr	30-50	Severe/0.02	Soils have high erodibility potential. Need to design improved road access with maximum drainage'– minimize soil disturbing activities, and time work for the dry season.
193	Haypress-Toiyabe families complex	17.66	29.95	None	20 – 49 cubic ft/ac/yr	2-30	Moderate/ 0.02	Need to design improved road access with maximum drainage.

[1]Erosion Hazard Rating = An expression of the potential of a soil to erode, considering the physical and chemical properties of the soil and climatic conditions where it is located. The stronger the expression, the greater the investment needed to maintain the sustainability of the soil resource base if intensively disturbed.
[2]Erodibility Factor K = An erodibility factor which quantifies the susceptibility of soil particles to detachment and movement by water. This factor is used in the universal soil loss equation (USLE) to calculate soil loss by water.
[3]cubic feet per acre per year = annual growth rate for forest productivity

Table 7 shows a summary of soil indicators that were visually assessed to evaluate existing soil conditions.

Table 7. Existing soil condition in the proposed project area.

Soil Function	Indicator	Condition[1]

Support for Plant Growth and Hydrologic Functions	Soil stability	*Upland borrow sites* – Good. Slopes are less than 35% and effective soil cover is well above 50% and evenly distributed. *Access road* – Fair. Minor rill erosion on existing access road to meadow. *Meadow/stream channel* – Poor. Gullied channel bisects meadow; strong evidence of active erosion on main channel and smaller tributary channels.
Support for Plant Growth Function	Surface organic matter (OM)	*Upland borrow sites* – Good. Amount of organic matter is within the range suitable for soil type, ecological setting, and fire return interval. *Meadow/stream channel* – Fair. Portions of the area are deficient in surface organic matter.
Support for Plant Growth Function	Soil organic matter (SOM)	*Upland borrow sites* – Good. Thickness and color of upper soil layer is consistent with soil type and ecological setting. *Meadow/stream channel* – Fair. Thickness and color of upper soil layer is not consistent with ecological setting and does not support expected plant species communities adequately.
Support for Plant Growth Function	Soil strength	*Upland borrow sites* – Good. Soil strength supports desired plant communities and root depths. *Meadow/stream channel* – Fair. Cattle trailing and infrequent vehicle access to meadow monitoring equipment has resulted in soil compaction that is minorly distributed throughout the meadow. Soil strength increased sufficiently to inhibit plant root growth in these areas.
Soil Hydrologic Function	Soil structure & macroporosity	*Upland borrow sites* – Good. Soil structure & macroporosity are relatively unchanged from natural condition. *Meadow/stream channel* – Fair. For minor portions of the area, erosion is evident and alters soil structure.

[1]Soil Condition:
good = meets desired condition
fair = partially meets desired condition
poor = does not meet desired condition

Existing Hydrologic Condition and Water Quality

There is a need to prevent further degradation of the stream and meadow system along Thompson Creek in order to improve low flow and peak flow conditions, increase the groundwater table elevation and duration, and improve water quality by preventing further bank erosion, providing stable stream channel structure, and reducing water temperatures. Under existing conditions, the stream channel for Thompson Creek is incised within the historic (pre-1850) meadow (Wood 1975) to a depth of 4 to 10 feet, with incised depths of more than 7 feet being most prevalent. This incision cuts the stream channel off from its historic floodplain, particularly along the reaches that are incised over 7 feet. For these severely incised reaches, high energy flood flows are confined within the incision, creating vertical, highly eroded stream banks. This accelerated erosion during large floods has washed away willows, sedges, and other riparian vegetation that can stabilize stream banks and channel structure, and provide surface water shade.

Temperature as a water quality criterion is often used based on upper limiting temperatures for important freshwater aquatic life species (EPA 1986). For this analysis, limiting water temperatures for rainbow trout were used to address water quality. Water temperatures measured by DWR between October 2006 and July 2019 were compared to maximum weekly average daily maximum temperatures established for spawning, embryo survival, growth, and survival of juvenile and adult rainbow trout

(Ibid). The number of days maximum weekly average daily maximum temperature limits was exceeded for rainbow trout (RT) life cycle requirements are summarized in Table 8. As shown in Table 8, current water temperature conditions as measured over the last thirteen years are most limiting for trout spawning and embryo survival, with growth and juvenile/adult survival water temperatures exceeded more frequently in the upper reaches of the project area.

Table 8. Existing water temperature conditions in relation to rainbow trout life cycle requirements in the proposed project area measured from October 18, 2006 through July 16, 2019.

# of Days 7DADM[1] Exceeded Upper Limits for Rainbow Trout Life Cycle Values	7DADM for Spawning, 9° C/ 48° F (January-June)	7DADM Short-term Maxima for Embryo Survival, 13° C/ 55° F (January-June)	7DADM for Growth, 19° C/ 66° F (April-October)	7DADM Short-term Maxima for Juvenile and Adult Survival, 24° C/ 75° F (April-October)
Top of Project Area – at rock dam	953	558	636	84
Bottom of Project Area - at headcut waterfall	911	558	271	0

[1] Seven Day (or Weekly) Average Daily Max (7DADM) is defined as a 7-day running average of daily maximum temperatures calculated for each day as an average of daily maximum temperature observed for that day and for six consecutive prior days.

Under the existing condition, it is unlikely that any but the most extreme flood events would allow the channel to overflow onto the historic meadow. Therefore, much of the soil and bank-building sediment materials are transported through the degraded channel, rather than deposited onto the floodplain. Transport of sediments through the channel reduces water quality downstream because of in-channel sedimentation. In addition, shallow groundwater flows have been altered due to the incised channel and the lack of a fully developed floodplain. Warmer water temperatures at the top of the project area are likely attributed to the altered groundwater regime, with the headcut at the bottom resulting in cooler water temperatures at the bottom of the project area due to the drain effect on groundwater.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

Geology and Soils

Soil stability/Effective soil cover

The proposed project would result in creation of some areas of bare soil, particularly in the areas where partial channel fill plugs are constructed, where the complete channel fill is constructed, and in the hillside and meadow borrow areas. Topsoil excavated from the borrow sites would be stockpiled and then spread over the surface of the partial channel fill and the meadow and hillside borrow areas to facilitate quicker establishment of vegetation on the newly constructed surfaces. Existing dormant seed within the placed topsoil would provide substantial vegetative regrowth and soil cover, particularly for the channel fill and meadow borrow areas where the restored water table would reinvigorate meadow vegetative species. Additionally, filled surfaces and borrow areas would be seeded with locally collected native grass seed. Sedge mats would be excavated from the existing channel bottom and placed over much of the surface of the complete channel fill reach and along edges of partial channel fill plugs. Construction traffic across the meadow would cause bare vehicle tracks but would not remove topsoil so vegetative regrowth is expected. Hillside borrow areas would be tapered to match existing contours.

Significant vegetative regrowth within one to three years is expected on bare soil areas created by the proposed project, resulting in effective soil cover well in excess of 70% throughout the project area. This soil cover would support natural plant growth function and prevent any areas of accelerated soil erosion on the meadow or hillside borrow areas. Raising the water table in the meadow would result in riparian vegetation establishment on stream channel banks.

Soil porosity and compaction

The proposed project would result in creation of some areas of soil compaction, particularly along the tracks of construction vehicles. Where necessary, these tracks would be scarified with construction equipment to restore soil infiltration. Excavation of hillside borrow areas would be implemented with tracked equipment to limit ground pressure and traffic would be dispersed across the hillsides. Hillside borrow areas would be tapered to match existing topographic contours and final constructed surfaces would have soil density similar to the adjacent natural conditions. Partial channel fill and complete channel fill embankments would be constructed with similar soil densities as adajacent meadow soils. With soil density essentially restored to levels of adjacent undisturbed soils, soil plant growth function and soil hydrologic function are not expected to be impacted by the proposed project.

Establishment and reinvigoration of meadow and riparian vegetation, as described above for soil cover, would improve future soil infiltration in the restored meadow due to plant root activity. Similarly, regrowth on the hillside borrow areas would aid soil infiltration. Root activity due to vegetative regrowth on construction vehicle tracks in the meadow, aided by the restored water table, would further reduce soil compaction that occurred during construction.

Surface organic matter

Potential soil organic matter impacts associated with the proposed project would generally be limited to surface soils and direct effects would be similar to those described above for soil cover. Topsoil excavated from the borrow sites would be stockpiled and then spread over the surface of the partial channel fill and the meadow and hillside borrow areas, facilitating quicker establishment of vegetation on the newly constructed surfaces and returning the soil organic matter to existing levels. Construction traffic across the meadow would cause bare vehicle tracks but would not remove topsoil. Soil organic matter is a concern for the proposed project at the areas of the complete channel fill reach that are not covered by transplanted sedge mats. These exposed soils would consist of material excavated from the deeper layers of the hillside borrow areas, which contain substantially less organic matter than the topsoil layers. Seeding on these complete channel fill surfaces, as well as the raised water table, would facilitate vegetative regrowth that would provide soil organic matter in the future.

Indirect effects of the proposed project on soil organic matter would be beneficial, due to reinvigoration of meadow and riparian vegetation caused by the raised water table. Significant vegetative regrowth within one to three years is expected on bare soil areas created by the proposed project, resulting in substantail future increases in soil organic matter. Vegetation establishment on the bare surface areas of hillside borrow soils not covered by transplanted sedge mats on the complete channel fill reach is expected to be quick since the surface of these areas would be within one foot of the restored water table. Within one to three years of implementation of the proposed project, soil organic matter throughout the project area is expected to be well in excess of 50% and would adequately support natural plant growth function.

Soil moisture regime

Direct effects to soil moisture regime as a result of the proposed project would be similar to the groundwater retention effects described below. The proposed project would fill the incised mainstem stream channel through the meadow, raising the water table to within rooting depth of plants throughout much of the meadow. Under the existing condition, the incised channel causes the water table to drain significantly following the winter and spring runoff period, resulting in xeric vegetation such as sagebrush throughout the meadow. Shallow soil profiles in the meadow indicate that soils were wet for longer duration in the past, presumably prior to channel incision. The water table along the

filled channel and adjacent meadow areas would rise and groundwater would accumulate in the meadow during the first precipitation season after constructon of the proposed project. Soil moisture in the hillside borrow areas would be unaffected by the meadow restoration treatments.

Soil moisture regime effects of the proposed project would primarily be direct effects, occurring within the first precipitation season after treatment. The raised water table as a result of the proposed project would keep soils wet for a longer period of time. Indirect effects due to longer periods with high soil moisture levels are expected to be beneficial supporting plant growth and vigor later into the season.

Soil quality indicators

Vegetation and grazing management activities, in conjuction with proposed project activities, in the project area would have little or no effect on soil cover, soil compaction, soil organic matter, or soil moisture regime. Cumulative effects from past vegetation management in the analysis area have not significantly altered soil cover and future vegetation treatments would maintain the areal extent of soil cover in excess of 70% (USDA 2011). Past vegetation management in the analysis area has not significantly altered soil porosity and compaction within the project area. Few relic skid trails are evident in the proposed hillside borrow areas and, where present, were found to be well vegetated and have not significantly impacted soil plant growth function. Cumulative effects to soil organic matter are similar to those for soil cover. Past vegetation management in the analysis area have not significantly altered soil organic matter and future vegetation treatments would maintain suface soil organic matters levels well in excess of 50% (USDA 2011). Timber harvest and thinning of forest stands can slightly decrease soil moisture by exposing more soil surfaces to solar radiation. However, these changes are small and are likely to affect soil plant growth function.

On-going livestock grazing will continue to have a potential effect on soil cover, particularly where cattle trails form. The proposed fence around channel restoration treatments would protect the regrowth of meadow and riparian vegetation that will provide adequate soil cover. SNFPA ROD standards and guidelines for grazing limit the amount of meadow forage that can be utilzed by grazing. The proposed project would result in improved vegetative vigor that can better withstand grazing pressure when grazed. Compacted cattle trails on the meadow could confine meadow runoff, causing small flood flow channels that could become erosive. However, these cattle trails would be dispersed across the meadow and would lilely not connect to form channels that carry large volumes of runoff, particularly since the proposed project would result in flood flows being shallow and well dispersed across the meadow. Cattle trailing along the proposed fence is a particular concern, since these trails could run for significant connected distances along the fence. However, the meadow vegetation reinvigorated by the raised water table would provide stability for any potential erosion caused by flood runoff within the cattle trails. Cattle trails would be monitored by the grazing permitee and minor fence location adjustements made if necessary. SNFPA ROD standards and guidelines for grazing limit the amount of grazing activity in the future so vegetative cover and soil organic matter development would continue to be well above soil quality standards for support of plant growth.

Hydrology and Water Quality

Cumulative Watershed Effects Model for Proposed Project

Under the proposed project, Equivalent Roaded Acre (ERA) values for the project area sub-watershed (1,738 acres) would remain well below the 12 percent threshold of concern after implementation of the proposed actions along with past, present, and reasonable foreseeable actions (see Figure 4 above and Table 5 of Hydrology and Soils Report). The results indicate that these actions would not cause alteration of surface runoff patterns within the watershed such that beneficial uses of water would be impacted.

Sedimentation

The proposed project could result in some short-term increase in sediment from land disturbances associated with temporary access routes, staging areas, and construction activities associated with

riffle and channel fill treatments. However, project activities under Alternative A would be controlled by BMPs and design features that would prevent or minmize sediment production and delivery due to project work. BMPs at staging areas, hillside borrow areas, and along the access road would disperse drainage from those areas and prevent sediment delivery to any adjacent waters. Sediment generated from disturbed areas associated with channel and meadow treatments is not expected to leave the project area due to the relatively low meadow gradient and because the meadow borrow sites (ponds) and in-channel pooled areas behind raised riffle structures and the grade control structure would catch construction-generated sediment. Channel fill, partial channel fill, and riffle construction would occur during the low flow season. Partial channel fill would occur outside of live streamflow, as flows are directed into the remnant channel with the construction of the first plug. Raised riffle and grade control structures would be constructed in-stream during the low flow season and any associated fine sediment would be captured in the pools behind these structures or at downstream temporary catchment structures.

The proposed project would result in returning channel flows to the meadow surface, allowing flood flows to access the valley floodplain, where sediments from upvalley overland flows could be deposited on the floodplain rather than being transported to downstream reaches of channel. Vegetation would be re-invigorated by the higher water table and would maintain long-term stability. Flood flow access to a vegetated floodplain would result in reducing streambank erosion and sedimentation by eliminating the concentrated flow velocities and stream energy within the gully. Sedimentation from the development of remnant channels is not expected to be higher than would normally occur in a meadow channel.

It could be argued that the project would “starve” the system of sediment, both in the long term and downstream of the project area. Several key factors about the project area preclude this effect: 1) the small size of the watershed, low precipitation, and naturally broad meadow floodplain all contribute to a system with very little natural fine sediment production; and 2) natural channel meandering over time contributes a small amount of sediment to the system. The proposed project would allow sediment to deposit in the project area, rather than contributing sediment to downstream areas.

In the long term, and based on the response of similar projects, it is expected that within the first growing season after construction, plants will begin to colonize bare soil areas. Transplanted on-site vegetation is expected to have a 75%-80% survival rate. The vigorous vegetation on the meadow-elevation floodplain is expected to result in a reduction of sediment generation through the project area during the first year.

According to the United States Federal Highways Administration (FHWA) design circular (US DOT 2005), native grasses are capable of resisting tractive forces up to approximately 1.2 pounds per square foot. Thus, the risk of losing plug surface soils would be highest in the first year after construction, before vegetation has a chance to take hold. Erman et al (1988) showed that snow depths can restrict floodplain area and confine flood flows. If this were to occur in the project area, greater flow depths during a flood would be realized, with accompanying increases in shear stress. Unvegetated areas, including fill surfaces in the near-term after implementation, would be most vulnerable to erosion as a result of such increased shear stresses. However, fill design criteria and vegetation transplants discussed above would prevent significant instability of the restored reach due to flood flows confined by snow.

A large input of sediment could potentially result from a partial fill segment failure. The risk of such an event would be highest in the first year after construction, before vegetation has a chance to take hold. However, this risk has been minimized in the design through the following design criteria: 1) the target design head differential from one partial fill to the next is low, one foot or less. This low differential is well within the rooting depth of plants so that downstream partial fill edges are protected via plant roots; 2) during construction, rooted vegetation (predominantly sedges) is planted along the downstream partial fill edges so that even if a large run-off event occurs in the first year after

construction, the vegetation will provide physical protection from erosion; 3) topsoil excavated from the borrow sites would be stockpiled and spread over the surface of the completed fill to facilitate quicker establishment of vegetation on the newly constructed fill surface. Filled surfaces would be seeded with locally collected native grass seed; and 4) partial fill elevations are kept low to promote vegetation growth but are slightly higher than the adjacent floodplain so that overland flow is not likely to spill over the fill edge. The project will end at a constructed large rock valley grade control structure that provides a stable terminus for the project. Flood flows over this structure would be stair-stepped down this structure to the elevation of the existing channel bottom at the downstream end of the project, thus reducing the chance for headcutting to move up the valley from the action of falling water.

By and large, the partial channel fill meadow restoration projects that have been implemented in Plumas County since 2001 have withstood several years of significant flooding, with the vast majority of projects still meeting the restoration objective of restoring water tables and spreading high flows across the meadow floodplain. The most comprehensive field review of the condition of constructed partial channel fill projects was performed by PNF staff in 2011 for projects constructed between 2001 and 2007 in the Last Chance Creek watershed (USDA 2019f). All constructed plugs in these restored reaches were surveyed, although some of the plugs could not be located because the plugs had re-vegetated well and looked similar to the surrounding meadow landscape. Eighty-two constructed plugs were reviewed, with just over half of those exhibiting no evidence of flow erosion. Thirty percent of the plugs exhibited erosion of concern (an erosion rill at least nine inches deep or a rill that runs the full length of the plug), but small beaver dams had effectively stabilized many of those rills. Additionally, six plugs have been stabilized with rock or other techniques since the 2011 survey. Field checks conducted in 2018 for the Last Chance Creek watershed projects found no additional significant plug erosion issues following the heavy floods of 2017.

While project observers commonly assert that a plug that has experienced surface erosion has “failed,” a closer look at meadow flow dynamics demonstrates that a partial channel fill project can withstand some segments of plug erosion. Project objectives to restore the meadow water table and floodplain connectivity are compromised only when a rill across a plug develops that is lower than the meadow surface stream channel. Only three of the 82 plugs (4%) along Last Chance Creek projects were completely breached by flood flows, meaning that the stream’s lowest seasonal flows run through the plug, causing a lowering of the water table and loss of floodplain connection in those short segments of the restored reach. At these locations, the breached plug does fail to provide vertical control of the elevation of the meadow stream channel, although the channel elevation is typically found to be held close to the meadow surface by the next constructed fill downstream. Figure 5 shows a plug that on the Jordan Flat project was completely breached by flood flows and caused a lowering of the meadow stream elevation. However, a recently constructed beaver dam has raised the channel elevation and water table at this location and the project is still serving its intended purposed of raising the meadow water table and restoring floodplain function.

The three-mile-long project on Red Clover Creek that was constructed on USFS lands near the Poco Creek tributary in 2010-2011 has experienced the most plug erosion of any partial channel fill restoration constructed on USFS lands in the upper Feather River watershed (Hoffman 2011). However, the project is still largely meeting the objective of raising the meadow water table and restoring floodplain connection, primarily due to beaver activity that has stabilized many spots of plug erosion and also due to stout sedge vegetation that is maintaining the designed plug elevations along the downstream and upstream edges of the plugs. This is particularly evident along the 1.5 mile reach above Chase Bridge. The lower portion of the project downstream of the bridge has experienced breaching of three plugs in the recent flooding of 2017 and 2019, causing a few segments of stream that are several hundred feet long where the stream channel runs through the breached plugs and the meadow water table elevation has lowered below the rooting depth of meadow vegetation. High flood flow stresses and the narrow width of the natural valley floodplain along this reach have been identified as primary causes of the instability of the restoration treatments along this reach (Hoffman

2014). By contrast, the four miles of partial channel fill restoration on Red Clover and McReynolds Creek on private lands immediately upstream of the USFS Poco Creek project has remained remarkably stable throughout all floods since its construction in 2006. Similarly, the 2.6 mile long Dotta Canyon project along the upper reach of Red Clover Creek has experienced very little plug erosion since its construction in 2013. Erosion of channel fills similar to erosion that has compromised the integrity of the downstream portion of the Red Clover Poco restoration project is not expected for the Thompson Meadow proposed project because flood flow magnitudes will be much less for the smaller Thompson Creek watershed and because the Thompson Meadow floodplain is proportionately wider than the floodplain at the lower reach of Red Clover Poco.

Figure 5. Photos of a constructed plug breached by flood flows and repaired by beaver dam. On the Jordan Flat project. Above photo is April 2015. Below photo is August 31, 2018.

Groundwater retention

The proposed project is expected to significantly improve groundwater retention. In the current incised condition, groundwater primarily contributes to surface water streamflow early in the season, soon after spring precipitation ends. This is because the depth of the incision acts like a drain on the precipitation stored as groundwater in the meadow. A study of Sierra Nevada meadows included the proposed Thompson Meadow project area and estimated that zero groundwater discharge to the stream occurred from July 1 to September 30 in 2012 and 2013 (USDA 2015). The existing deep incision causes groundwater to "fall" out of the floodplain more quickly, from a low hydraulic gradient within the meadow soils to the incised stream gradient that is located several feet below the meadow surface (a very steep hydraulic gradient from the meadow water table to the incised stream). This lowering of the water table is directly analogous to the resultant cone of depression that occurs due to groundwater well pumping (Essaid 2014). Reconnection of the stream channel with the meadow floodplain would have a beneficial direct effect on groundwater retention, resulting in higher groundwater elevations for longer periods during the spring and summer seasons.

The proposed project would allow groundwater to release more slowly. The drain effect associated with the current incised stream channel would be significantly reduced due to the low elevation difference and hydraulic gradient associated with the restored meadow water table and the restored stream channel elevations, which would be within one to two feet of the water table. The proposed project would restore the meadow water table close to natural elevations and return stream flow to the surface of the meadow so that the direction and gradient of groundwater flow would be converted from a steep direction toward the incision to a flatter direction down the length of the valley (Ohara 2013), potentially resulting in groundwater contribution to the stream later in the season. This would cause groundwater to remain within meadow soils much longer through the spring and summer seasons.

Cumulative effects to groundwater retention under the proposed project would be positive and would be associated almost exclusively with the meadow restoration treatment actions. Groundwater retention associated with timber and vegetation management activities are comparatively very small. Such effects stem from improved groundwater retention due to less interception of precipitation after timber and vegetation is thinned, offset by increased drying of soils when surfaces are exposed to more solar radiation after thinning. Similarly, grazing activities have little effect on groundwater retention, other than possible compaction and loss of infiltration (discussed above in the soils section).

Water temperature

In the short term during construction, water temperatures within the project area may become warmer at isolated areas as the meadow borrow sites (ponds) and pools behind raised riffle structures begin to fill; similar to existing conditions at the top of the project area behind the rock dam. Water temperatures downstream of the project area are expected to remain at background levels, due to the influence of tributary and groundwater flows. Surface water in the meadow borrow sites and ponds, however, would be subjected to increased solar radiation, which is likely to warm their surface water temperatures.

Effects to water temperature from the proposed project would primarily be indirect, occurring later in time and away from the project area. After construction, monitoring of similar projects has indicated that temperatures remain cool in pond bottoms (Figure 6) (Plumas Corporation 2010). Warmer temperatures at the surface of the existing channel borrow sites are not expected to affect instream temperatures because these ponded areas are only connected to flowing areas during periods of flooding, when water temperatures throughout the restored meadow would be cool.

After construction, re-introduction of flowing water into remnant channels on the surface of the meadow is expected to re-invigorate the wet meadow species along the banks. It is expected that the vegetation recovery combined with the action of flowing water and background sediment supply, would begin a narrowing and deepening of the channel, leading to well-vegetated undercut banks with

riffles and deep pools resulting in a lower width-to-depth ratio. This channel geometry, and the increased bank and vegetative shading, would contribute to cooler water temperatures. This process of developing undercut banks would be limited to the reaches of the proposed project where the base flow channel is redirected to the meadow surface; that is, undercut banks are not expected to develop along the stream reaches treated with raised riffles. Development of undercut banks may be a slow process (several years to decades) because of the low flow rates and small sediment supply associated with this small watershed. Existing water temperature in these reaches will be maintained by the small amount of perennial surface flow in the stream, with cooler temperatures expected in the deeper levels of the pools behind the raised riffle and grade control structures.

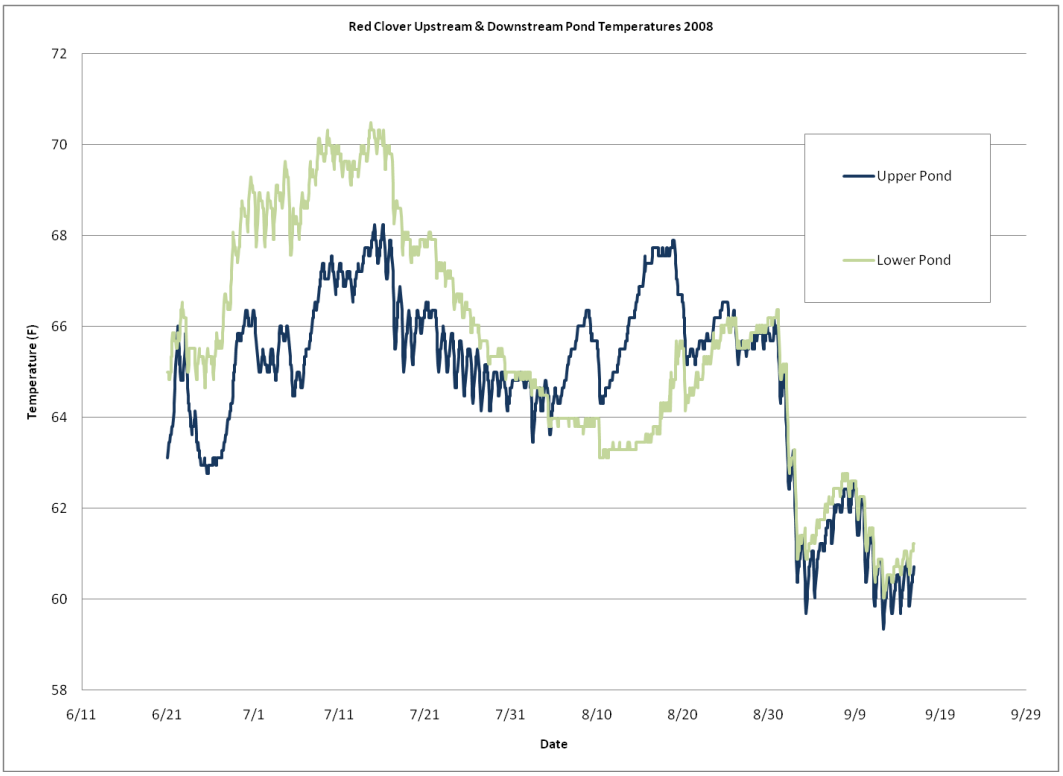

Figure 6. **Water temperatures in pond bottoms at the Red Clover McReynolds Project.** For the furthest upstream and furthest downstream ponds. Data show that temperatures remain cool in pond bottoms (Plumas Corporation 2010).

Instream temperature through the summer months is expected to improve within the project reach as a result of the proposed project due to increased groundwater retention. The proposed project is expected to improve groundwater retention. Groundwater retained in the meadow and released slowly to the stream through the summer would benefit stream temperature. During warm periods, groundwater input to streams lowers stream temperature and buffers diurnal stream temperature variations (Loheide 2007). Loheide observed increased groundwater input and decreased stream temperatures from a 1995 pond and plug project completed on the Beckwourth Ranger District (Big Flat at Cottonwood Creek, a tributary to Last Chance Creek) and stated that pond and plug restoration may derease maximum stream temperatures by more than three degrees centigrade. Monitoring from similar past projects indicate that there is an overall decrease in temperatures (USDA 2019f). At a larger watershed scale, changes to stream temperature as a result of the proposed project are expected to be small and immeasurable.

ERA calculations indicate that the wide, shallow stream channel conditions that have impacted stream temperatures within the project area are not likely to be exacerbated as a result of changes in watershed hydrology caused by land management activities. Cumulative impacts to water temperature from past timber management activities are expected to be minimal because water is not perennial on the timbered areas of the watershed above the project area. Timber management has not increased

solar radiation to water in the project area, because past and future timber cutting is not close enough to perennial surface water in the project area to affect water temperature under either alternative. On-going grazing management has the potential to cumulatively impact water temperature if shade species such as willow are grazed or if stream channel structure is impacted. However this likelihood is negligible because standards and guidelines in the 2004 SNFPA ROD prevent excessive grazing pressure on channels and floodplains. Also, the newly restored channel area and wet meadow will be fenced off and grazing restricted for several years post-project. The fenced area will be managed post-project so as to minimize impacts to vegetation. Shade provided by willows can help decrease the warming effects of direct sunlight on the water. Current standards and guidelines for grazing do not allow more than 20% use of willow. This standard should allow for some annual willow growth, leading to a trend toward more shade and cooler water temperatures. Also, willows are not preferred by cattle unless other forage is unavailable. The proposed project is expected to support the growth of shade-producing willows along the stream channel under current standards and guidelines, which reduce the impacts of grazing on any plants along the streambank. This should cumulatively lead to lower water temperatures within and near the project reach.

Stream flow

Restoration construction activities would occur during the low flow season. There would be short-term direct effects to flow during construction in the partial channel fill reaches. For these reaches, surface flow would be retained within the channel borrow areas (ponds) throughout the time when construction occurs. The effect to downstream flows in larger streams (like at the confluence with Red Clover Creek) would be negligible because the Thompson Creek flow rate during the anticipated time of construction is very small. DWR monitoring at the downstream end of the project area found an average maximum daily flow of 0.18 cfs from August 15 through November 1 of 2016 (an above normal precipitation year). Surface flow would resume at the downstream end of the project area after construction is complete and after sufficient fall precipitation has occurred to recharge the ground water table and fill the channel borrow areas. Proposed channel fills would be constructed to have a groundwater permeability that is similar to adjacent meadow soils. Throughout the period of construction and water table recharge, water retained in the project area would continue to flow down valley as groundwater, likely emerging as surface water at some point downstream.

Red Clover Creek is a tributary stream to Indian Creek. In 1950, the State of California completed a determination of the rights of various claimants to the water of the Indian Creek system (Decree No. 4185, commonly known as the “Indian Creek Decree”)(Superior Court of CA 1950). No decreed diversions exist along Thompson Creek or McReynolds Creek, which flows to Red Clover Creek. Approximately one dozen decreed diversions exist on Red Clover Creek and its tributaries upstream of the confluence with McReynolds Creek, but most are no longer being utilized. The remaining 6 decreed diversions on Red Clover Creek, totaling a maximum of 2.15 cubic feet per second, are located more than 10 miles downstream of the proposed project, within one mile of the creek’s confluence with Indian Creek in Genesee Valley. At least one of these diversions is used every year and is an important source of irrigation water. Most of the water in Red Clover Creek that is available to these users comes from several small streams on the north side of Mount Ingalls that flow to Red Clover Creek in the canyon immediately above Genesee Valley, several miles downstream of the proposed project (DWR 1946). Construction of the proposed project during the low flow season is not expected to result in a measurable change in the amount of water available to decreed claimants in Red Clover or Indian Valleys.

Another direct effect on flow would be the creation of nine ponds (less than one acre total area) under this alternative within the project area. The water level in the ponds would not be connected to surface streamflow during most of the year, particularly in summer months, and would rise and fall with the groundwater level. Hydrologically, the ponds act as floodplain (i.e. groundwater retention and release) and low velocity regions during overland flow events. Ponds on similar projects were studied and found to act as groundwater recharge zones, sustaining meadow groundwater levels during the

summer (McMahon 2013). Pond evaporation rates were found to be similar to evapotranspiration rates in restored meadows (USDA 2015). Although evaporation accounted for 40% to 70% of summer water loss in the ponds, the remainder of the water lost from ponds was recharged to the local meadow aquifer.

As mentioned above for water temperature, effects on streamflow are mostly indirect, and are multi-fold and synergistic. Changes to streamflow are primarily due to the restored retention and release function of the shallow meadow floodplain. The proposed project would reduce the area of the channel, so that flows overbank onto the floodplain more frequently. The more frequent overbanking is likely to lessen the sharp peaks and declines in stream flows due to precipitation events. It would also release that water later in the season, thus potentially increasing base flow downstream of the project.

Benefits to late season streamflow due to enhanced groundwater retention can be offset by increased evapotranspiration due to re-invigorated riparian vegetation in the meadow. A mapping algorithm applied to two reaches that were treated with pond-and-plug on Last Chance Creek on Plumas National Forest showed that daily evaprotranspiration rates were roughly double the rates observed on degraded reaches that had not been restored (Loheide 2005).

Five previous studies in the Sierra Nevada have demonstrated changes in streamflow following meadow restoration. These studies indicate a range of responses but generally demonstrated that restoration increases summer baseflows downstream of restored meadows. Channel filling of an incised gully in Indian Valley (south of Lake Tahoe) resulted in increased total summer outflow that was five to twelve times greater than total summer outflow before restroration (Hunt 2018). Pond-and-plug restoration of Trout Creek near Lake Tahoe resulted in higher water table elevations, reduced streamflow during the early part of the snowmelt season, and increased mid-summer streamflow within the project area; post-restoration streamflow in late summer was about the same as pre-restoration flow (Tague 2008). Water temperature data were used to infer increased baseflow in restored meadow reaches relative to unrestored reaches on Cottonwood Creek (Big Flat) on Plumas National Forest (Loheide 2007). Hydrologic modeling applied to a pond-and-plug restoration project in Lassen County indicated a decreased duration of base flow at the midpoint of the restored meadow reach (Hammersmark 2008). The decreased mid-meadow baseflow was attributed to increased evapotranspiration and to loss of groundwater that would have drained to the incised channel pre-project but stayed as groundwater in the post-project condition and flowed out of the meadow downstream as either shallow groundwater or overland flow. Baseflow downstream of the restored reach was reported to have increased after restoration, but was not quantified.

A modeling study for the large, 96 square mile Last Chance Creek watershed above Doyle Crossing in Plumas County that included nine miles of meadow pond-and-plug restoration compared the surface flow response for the restored and unrestored using idential climate conditions observed from 1982-1993 (Ohara 2013). The model predicted a 10-20% decrease in flood peaks for the wettest year and baseflow increase of 10%-20% for the following baseflow season. This effect of reduced flood peaks is illustrated in unpublished data collected at Big Flat, a small meadow within the same study watershed (USDA 2019f). In meadows that are located in watersheds that are too small or too dry to have large volumes of regional groundwater flow, erosion and restoration are unlikely to greatly affect groundwater or streamflow either positively or negatively (USDA 2015). This expectation is also demonstrated by the Big Flat data, which shows improvements to streamflow early in the runoff season but little or no change by summer. The early season flow benefit was found to be statistically significant in a 2011 data analysis (Cawley 2011). Similarly, unpublished data for the stream gage at Doyle Crossing that compares streamflow for two similar years of precipitation (2002 and 2008) shows little difference in stream flow magnitude before and after restoration for the months of July, August and September (USDA 2019f).

These studies all illustrate the interdependence between watershed and meadow hydrology, bedrock and meadow aquifers, and surface and groundwater flow through the meadow. At a watershed scale, climate and geology are likely to be more important controls on meadow groundwater processes than erosion and restoration (USDA 2015). All of the studies that reported increases in baseflow after restoration also reported that overbank flooding during winter and spring, which would occur for the proposed project, was an important process in recharging meadow aquifers.

Existing studies generally indicate minor improvements in summer streamflow following restoration. None of the predicted changes are large enough to affect downstream water uses and none are predicted to negatively impact downstream water uses. Therefore, indirect effects to streamflow as a result of the proposed project are not expected to be large enough to significantly impact downstream users or beneficial uses of water. This expectation is reinforced by a monitoring study that was performed for Plumas National Forest. A statistical analysis of 11 years of continuous streamflow data taken at Notson Bridge on Red Clover Creek indicated no apparent statistical trend in streamflow during the low flow late season (no increase or decrease in flow) (Cawley 2011). This bridge is located six miles downstream of large-scale pond-and-plug treatments that occurred on Red Clover Creek between 2006 and 2011 and five miles upstream of the nearest irrigation diversion from Red Clover Creek. Given the small area of meadow that is proposed for restoration relative to the amount or restoration that previously affected Red Clover Creek, the proposed project clearly will not significantly affect streamflow either positively or negatively at the location of the nearest downstream water use diversion.

Stream flow emanating from the bottom of any watershed is cumulatively affected by watershed conditions. The existing degraded condition of the project area has significantly altered the natural streamflow regime of the meadow. The proposed project would restore floodplain function and move the meadow back toward natural hydrologic function. ERA calculations indicate that the management activities of the recent past and the activities proposed for the present and near future do represent a significant risk that surface runoff patterns or timing would be altered again toward degraded conditions (USDA 2019f). If past timber management activities removed enough vegetation, then it is possible to contribute to a cumulative increase in streamflow. However, not enough vegetation has been removed to measurably detect a change to streamflow from timber management (Troendle et al 2007).

On-going cattle grazing has contributed to the existing condition in the project area, which is characterized by a deeply incised channel in a drying meadow. Channel incision affects streamflow by reducing season-long surface and ground water interaction. In the current condition, groundwater primarily contributes to surface water streamflow early in the season, soon after spring precipitation ends. This is because the depth of the incision acts like a drain on the precipitation stored as groundwater in the meadow. The proposed project would return stream flow to the surface of the meadow, so that seasonal groundwater in the floodplain can contribute more slowly (i.e. later in the season) to surface water streamflow. It is basically a matter of gravity. The existing deep incision allows the groundwater to “fall” out of floodplain more quickly. The proposed project would allow groundwater to release more slowly. Current grazing standards and guidelines do not allow for more than 20% alteration of stream banks from cattle grazing. This standard is expected to lead to long term bank stability, so that future channel incision, and its resultant effect on streamflow, would not be caused by cattle grazing. The proposed project would support this current standard because grazing would be restricted in the riparian area for several years following restoration and would be closely monitored in sub-sequent years.

Floodplain Function

Three key aspects of floodplain function are sediment, water temperature and stream flow. These functional processes are discussed separately above. The proposed project would directly affect the frequency with which the channel floods the meadow floodplain. The existing stream channel is deeply incised such that only the largest flood flows would access the meadow floodplain. Even the large peak

flood of 2017, estimated throughout the upper Feather River watershed to be a flood flow that has only been exceeded once or twice in the past 80 years, did not flow higher than the incision depth and reach the meadow surface within the project area (Figure 7). Flood modeling for the proposed project design has been performed using the US Army Corps of Engineers Hydrologic Engineering Center's River Analysis System (HEC-RAS) (USACE 2016). This modeling demonstrates that flood flows are annually expected to access the meadow floodplain throughout the project reach.

Figure 7. **Photos of the headcut on the mainstem of Thompson Creek near the downstream end of the project area.** Above photo is during low flow season (June 2015). Below photo is during peak flood event of February 9, 2017. Note that, due to the incised stream channel, stream flow does not access the meadow floodplain even during this extreme flood event.

Floodplain Function, Proposed Project Indirect Effects

Returning the channel to the elevation of the meadow would restore 47 acres of floodplain and meadow and 0.68 miles of riparian and aquatic habitat. The higher water table would be available to the rooting zone of the remnant wetland plant community in the meadow, and reduce invading xeric species. Groundwater recharge of the meadow would begin immediately and occur throughout the floodplain, over the first one to three winters. Where past restoration efforts have similarly raised the water table, wetland vegetation has resumed dominance (Hunt 2018). Changes in riparian and meadow plant communities are expected to take one to three years for a noticeable response, and possibly three to eight years for vegetation on disturbed soil to develop and mature. Plant community characteristics would be monitored as an indirect measurement of floodplain function, based on the presence of moist community plants on functional floodplains versus xeric community plants that are found on uplands. The proposed project is expected to convert the near-gully plant community from primarily a xeric community (i.e. dominated by sagebrush), to a moist community (i.e. dominated by sedge). This conversion would be measured by the dominance of the plant community along a moisture gradient (currently >50% sage converted to >50% sedge). Streamflow, water temperature, and sediment are all interconnected with floodplain function. See discussions above for expected effects of the proposed project on these specific attributes of floodplain function.

The purpose of the proposed project is to restore channel and floodplain function within the project area. Past projects have demonstrated that pond-and-plug treatments effectively restore floodplain function. Past timber management on the slopes is not likely to have affected floodplain function because of the distance between the activities and the meadow floodplain. This would continue to be the case under either alternative. On-going grazing can affect the vigor of floodplain vegetation, however, current grazing standards and guidelines are designed to ensure maintenance of floodplain vegetation. The proposed project would support the maintenance of floodplain vegetation while still allowing grazing under current standards and guidelines, because floodplain moisture would be enhanced under this alternative.

CEQA Considerations

Refer to the Alternative A discussion. During temporary project construction, topsoil would be retained and sedimentation would be minimized with implementation of project design criteria and permanent and temporary BMPs. Impacts would be further minimized with the implementation of the avoidance, minimization, and mitigation measure outlined below. Disturbed areas would be restored and stabilized by seeding with local native grasses and placing sedge mats in the channel bottom, resulting in a less than significant impact to water quality and stormwater runoff. Post-construction, restored hydrology would increase the water table elevation and allow for groundwater input in the form of base flows to reduce stream temperatures during warmer months, resulting in a beneficial effect to water quality and water supply. Changes in grazing management (fencing, temporary exclusion of livestock use for 2-3 years after project implementation, and modified livestock use after vegetative recovery) would reduce existing impacts to soils and water quality and would result in a beneficial effect.

Avoidance, Minimization, and/or Mitigation Measures

Prior to construction in each treatment area, water would be diverted around the treatment reach to protect water quality and downstream aquatic life.

Alternative B – No Action

Geology and Soils

Soil stability/Effective soil cover

Under the No Action Alternative, effective soil cover would be unchanged. Soil cover in the proposed hillside borrow sites and meadow area would continue to meet current soil quality standards and support soil plant growth and hydrologic functions. Unvegetated and eroding streambanks along the mainstem channel would not be stabilized and would continue to be subjected to high stream flow stresses associated with flood flows confined to the incised channel. Headcuts that exist where the

westside tributary channels meet the mainstem, as well as the large headcut on the mainstem channel near the downstream end of the project area, would not be stabilized, and would likely erode further upstream in future flood events, causing further erosion and loss of meadow soils to the downstream channel.

Soil porosity and compaction

Under the No Action Alternative, soil porosity and compaction would be unchanged. Existing soil compaction in the proposed hillside borrow sites and meadow area is minimal and soils would continue to properly support soil plant growth and hydrologic functions.

Surface organic matter

Soil organic matter would remain abundant, well over soil quality standards, and would continue to support soil plant growth function.

Soil moisture regime

Under the No Action Alternative, soil moisture regime in the project area would be unchanged. The incised channel along the mainstem would continue to cause the water table to drain significantly following the winter and spring runoff period, preventing the establishment of seasonally wet meadow vegetation that has historically existed along the channel.

Hydrology and Water Quality

Sedimentation

Under existing conditions sedimentation is generated within the project area by the erosion of gully walls along the channel. Under the No Action alternative, this trend is expected to continue. The difference between the proposed project versus the existing condition is that sediment will be deposited and contribute to bank and floodplain maintenance on the surface of the meadow under the proposed project, whereas in the existing condition, sediment is transported through the project area, causing negative impacts on water quality and fish habitat within, and downstream of, the project area. Under the No Action Alternative, rilling and surface erosion along the existing access road would not be treated. However, since erosion does not appear to connect to surface water, sedimentation impacts are not expected from the road.

Groundwater retention

Under the No Action Alternative, groundwater retention in the project area would be unchanged. The incised channel along the mainstem would continue to cause the water table to drain significantly following the winter and spring runoff period, preventing the establishment of seasonally wet meadow vegetation that has historically existed along the channel.

Water Temperature

Under the No Action alternative, no change is expected to the existing trend of water temperatures. Grazing is likely to continue to concentrate along the streambanks where shade species grow, thus slowing the growth of shade species to some extent, resulting in no change in the current trend in water temperatures.

Streamflow

Under the No Action alternative, the existing incised channel would continue to act as an early season drain for groundwater in the meadow. However, since a recent study has found that this effect diminishes significantly by mid-summer (USDA 2015), baseflows are not expected to be measurably higher during the low flow season. Several recent studies indicate that any difference in stream flow timing and magnitude between the proposed project and No Action alternatives would be small and immeasurable at a regional scale that might affect downstream water uses in Red Clover Creek.

Floodplain Function

The stream would remain over eight feet below the historic floodplain under this alternative, rendering floodplain access impossible except under extreme conditions. Functional processes and riparian

habitat vegetation would continue in a declining trend under this alternative. Advancing headcuts would continue to expand the separation of the channel from the floodplain, leading to further erosion until an adequate floodplain area is reached at the degraded gully elevation. The meadow would further its development as a terrace feature dominated by xeric plant species. There would be a further loss of soil at the site, and deposition of soil and silt in downstream reaches.

Compliance with the Forest Plan and Other Direction

The proposed project would comply with management direction, regulations, and pertinent laws associated with hydrology and soils. The proposed project would meet requirements of the CWA by implementing the BMPs from the Soil and Water Conservation Handbook (USDA 2011a), the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA 2012a), and the Pacific Southwest Region (Region 5) Supplement No. 2500-2012-1 for Soil Management (USDA 2012b). Compliance with Sections 401 (CVRWQCB) and 404 (USACE) of the CWA would be required. In addition, if required a CDFW 1602 permit and Section 402 (CVRWQCB) General Construction Activity Stormwater Permit would be obtained to ensure further compliance with erosion control and stormwater run-off.

Riparian Conservation Objectives (RCOs) are presented and described in Appendix A of the 2004 ROD for the SNFPA (USDA, 2004). Integral to achievement of these objectives are the 32 prescribed standards and guidelines for riparian conservation areas listed in section D of the ROD appendix. An analysis of the RCOs relative to the proposed project is presented below.

RCO #1: Ensure that identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.

Beneficial uses of surface water bodies that may be affected by activities on the PNF are listed in Chapter 2 of the Central Valley Region's Water Quality Control Plan (commonly referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (CRWRCB 1998). The proposed project drains to the North Fork Feather River, for which existing beneficial uses include municipal and domestic water supply, hydropower generation, recreation, freshwater habitat, habitat suitable for fish reproduction and early development, and wildlife habitat. Among these beneficial uses, aquatic habitat is the most sensitive to the most common water quality effect (delivery of fine sediment) that could potentially result from land disturbing activities such as those proposed for the project. For example, delivery of fine sediments from the proposed project could decrease the quality of coldwater fish habitat by infilling pools and embedding spawning gravels. Alternatively, land disturbance could cause concentration of surface runoff, which could result in detrimental changes to stream channel condition that could subsequently have effects on downstream water quality and beneficial uses. The purpose of the proposed project is to reverse the downcutting of the stream channel and resulting channel erosion in Thompson Creek. Project design features, including standard BMPs implemented during proposed construction, would prevent sediment delivery downstream that could significantly affect water quality. When the proposed project is considered along with other past or reasonably foreseeable actions in the area, the CWE would be short-term during project construction, but minimized through design, avoidance, and BMPs. Watershed effects would be beneficial upon project completion due to reconnection of the stream channel with its meadow floodplain, allowing surface runoff to spread across the meadow, eliminating sediment generated from the gully walls and gullied stream bed. Any fine sediments generated upstream of the project would be filtered as flows are dispersed over the meadow vegetation before they are conveyed downstream.

RCO #2: Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

Project design features and standard BMPs implemented during project construction would prevent sediment delivery to special aquatic features that would significantly affect water and habitat quality. The proposed project contains several elements that would improve special aquatic features, including channel and meadow restoration. Restoring the floodplain connection with the stream channel would elevate groundwater levels extending the duration of soil moisture within the root zone of the vegetation. This in turn would support wet meadow and wetland plant communities that would sustain special aquatic features. Increases in late summer stream flow may also potentially be a benefit of the proposed project.

RCO #4: Ensure that management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.

As described above, maintenance and/or restoration of physical and biological characteristics associated with aquatic and riparian dependent species would be assured through implementation of BMPs and project design. Livestock grazing within the proposed project area would be deferred for up to three years to ensure the establishment of wet meadow vegetation. When livestock are reintroduced into the established riparian pasture, a priority of grazing management would be the long-term sustainability of the restored meadow.

RCO #5: Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.

As described above in the analysis for RCO #2, the restoration of the stream channel and meadow floodplain would greatly benefit stream condition and stream flows.

RCO #6: Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.

As a result of the proposed project, restoring the floodplain function to Thompson Meadow would provide long-term enhancements to water quality and habitat for aquatic and riparian species. The proposed restoration activities would improve long-term protection of water quality within the project stream reach, as well as downstream of the project area. Approximately one mile of stream channel would be reconnected to its historic floodplain, minimizing sediment mobilization. Improvements to the existing access road would include constructing water bars to improve water quality by reducing erosion and sediment transport from the road surface.

4.2.8. Greenhouse Gas Emissions/Climate Change

Regulatory Setting

Key policies, guidance, executive orders, regulations, and legislation regarding greenhouse gases (GHGs) and climate change are summarized below. For additional information on air quality regulations, refer to the Air Quality section.

Federal Clean Air Act

At the federal level, the United States Environmental Protection Agency (EPA) administers the Clean Air Act (CAA). In 2007, the United States Supreme Court ruled that GHGs are “pollutants” under the CAA. In 2009, the EPA found, under Section 202(a) of the CAA, that six GHGs constitute a threat to public health and welfare, and that the combined emissions from motor vehicles cause and contribute to climate change. These findings serve as a prerequisite to any CAA regulations of GHG emissions from vehicles.

Climate Action Plan and Executive Order 13653

President Obama's 2013 Climate Action Plan and EO 13653 directs the federal government to strengthen its programs and operations and help communities nationwide prepare for climate change.

National Environmental Policy Act

In 2016, the White House Council on Environmental Quality released final guidance to assist federal agencies with their analysis of effects of GHG emissions and climate change in NEPA reviews of proposed actions. The guidance does not establish any particular quantity of GHG emissions as "significantly" affecting the quality of the human environment or give greater consideration to the effects of GHG emissions and climate change over other effects on the human environment. The guidance is meant to facilitate compliance with the existing legal requirements of NEPA.

California's approach to addressing GHG emissions and climate change involves the passage of several pieces of legislation.

Executive Order S-3-05

EO S-3-05 included the following GHG emission reduction targets: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; by 2050 reduce GHG emissions to 80 percent below 1990 levels. The executive order directs the Secretary of the California Environmental Protection Agency to develop and lead a climate action team of State agency representatives and report on the progress made toward meeting the targets to the Governor and the Legislature.

Assembly Bill 32

Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006, requires that GHG emissions in California be reduced to 1990 levels by 2020. To comply with AB 32, the California Air Resources Board prepared the AB 32 Scoping Plan, which lays out a GHG emissions reduction framework and identifies measures to meet the GHG emissions target. In May 2014, the *First Update to the Climate Change Scoping Plan* was released.

Senate Bill 97

In 2007, Senate Bill 97 required the Office of Planning and Research to develop amendments to the CEQA Guidelines that address the analysis and mitigation of GHG emissions. The CNRA adopted the amendments to the CEQA Guidelines in 2010. Key points are summarized as follows:

- Lead agencies must analyze the GHG emissions of proposed projects and reach a conclusion regarding the significance of those emissions (see CEQA Guidelines Section 15064.4).
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions (see CEQA Guidelines Section 15126.4[c]).
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions reduction plan that meets certain criteria (see CEQA Guidelines Section 15183.5[b]) (Office of Planning and Research 2016).

California Climate Adaptation Strategy

The CNRA updated its *2009 California Climate Adaptation Strategy* with *Safeguarding California: Reducing Climate Risk* in 2014. These policy guidance documents describe advances in climate science, climate risks, work done to date, and recommendations to manage climate risk.

Executive Order B-30-15

Per EO B-30-15, additional goals were set for the reduction of GHG emissions in California. By 2030, State agencies are further committed to reduce GHG emissions by 40 percent below 1990 levels and by 2050, reduce GHG emissions by 80 percent below 1990 levels.

For more information on the regulatory and affected environment, see *DWR's Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan* (GGERP), which details DWR's efforts to reduce its GHG emissions consistent with Executive Order (EO) S-3-05 and AB 32.

Plumas County

The Conservation and Open Space Element of the *Final Environmental Impact Report for the Plumas County General Plan Update* (County of Plumas 2013) includes strategies to address climate change and reduce GHG emissions. Policies and actions are listed under Goal COS-7.10: Climate Change.

Affected Environment

When sunlight reaches the earth's surface, shortwave energy heats the surface while longer-wave energy (infrared heat) is reradiated to the atmosphere. GHGs absorb this energy and trap the heat in the lower atmosphere.

Naturally occurring GHGs include water vapor, carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Synthetic GHGs include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). All of these GHGs, with the exception of water vapor, are targeted for reduction in AB 32. Nitrogen trifluoride (NF3) was not initially listed in AB 32 but was subsequently added to the list via legislation.

While CO2 occurs naturally in the atmosphere, such human activities as burning coal, oil, gas, and wood move carbon from solid storage to its gaseous state, thereby increasing atmospheric concentrations. Sources of CH4 are both natural (through biological processes in low-oxygen environments) and artificial (through rice farming, cattle production, natural gas use, and coal mining). Sources of N2O include agricultural and industrial processes, as well as vehicle emissions. HFCs and PFCs are synthesized compounds used as refrigerants or in manufacturing. SF6 is a synthetic gas used in the electricity and magnesium industries. NF3 is a chemical used in the manufacture of electronics.

The current global concentration of GHGs in the atmosphere is at unprecedented levels when compared with the past 800,000 years. Concentrations of CO2, CH4, and N2O have increased greatly since 1750 (40 percent, 150 percent, and 20 percent, respectively) (Intergovernmental Panel on Climate Change 2014). The long-lived GHGs (CO2, CH4, N2O, CFCs, HFCs, and SF4) are considered to be the largest and most important anthropogenic driver of climate change (Kadir et al. 2013). Among long-lived GHGs, CO2 is responsible for 64 percent of *radiative forcing*, which refers to a change in the earth's radiative balance resulting from an imbalance between incoming solar radiation energy and outgoing thermal infrared emission energy. CH4 contributes approximately 18 percent of total radiative forcing (Kadir et al. 2013; World Meteorological Organization 2012). To analyze the warming potential of GHGs, GHG emissions are typically quantified and reported as CO2 equivalents (CO2e).

Climate change refers to changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system over a long period of time. In California, observations of climate change include an increase in average annual air temperatures, a change in the trend toward more rain than snow, a change in runoff timing, an increase in extreme heat events, a decrease in winter chill times, a rise in sea level, and warmer conditions at higher elevations (Kadir et al. 2013; California Department of Water Resources 2015). Changes in climatic and environmental conditions can also strongly affect terrestrial, marine, and freshwater biological systems. Climate risk in the Sacramento River Hydrologic Region, within which the project area is located, includes stress on ecosystems and species resulting from increased temperatures, reduced reliability of water supplies caused by decreased snowpack storage, greater flood risks, and decreased water quality (California Department of Water Resources 2015).

In May, 2012, DWR adopted the *Climate Action Plan Phase 1: Greenhouse Gas Emissions Reduction Plan* (GGERP), which details DWR's efforts to reduce its GHG emissions consistent with Executive Order (EO) S-3-05 and AB 32. DWR also adopted the initial study/negative declaration (IS/ND) prepared for the

GGERP in accordance with the CEQA Guidelines review and public process. Both the GGERP and IS/ND are incorporated herein by reference (California Department of Water Resources 2012a; California Department of Water Resources 2012b). The GGERP provides estimates of historical (back to 1990), current, and future GHG emissions related to operations, construction, maintenance, and business practices (e.g., building-related energy use). The GGERP specifies aggressive 2020 and 2050 emission reduction goals and identifies a list of GHG emissions reduction measures to achieve those goals.

DWR specifically prepared its GGERP as a "Plan for the Reduction of Greenhouse Gas Emissions" for purposes of CEQA Guidelines Section 15183.5. Section 15183.5 provides that such a document, which must meet certain specified requirements, "may be used in the cumulative impacts analysis of later projects." Because global climate change, by its very nature, is a global cumulative impact, an individual project's compliance with a qualifying GHG reduction plan may suffice to mitigate the project's incremental contribution to that cumulative impact, to a level that is not "cumulatively considerable" (see CEQA Guidelines, Section 15064, Subdivision [h][3]).

Section 15064 further states that "[l]ater project-specific environmental documents may tier from and/or incorporate by reference" the "programmatic review" conducted for the GHG emissions reduction plan. "An environmental document that relies on a greenhouse gas reduction plan for a cumulative impacts analysis must identify those requirements specified in the plan that apply to the project, and, if those requirements are not otherwise binding and enforceable, incorporate those requirements as mitigation measures applicable to the project" (CEQA Guidelines Section 15183.5, Subdivision [b][2]).

Section 12 of the GGERP outlines five steps that each DWR project must take to demonstrate consistency with the GGERP.

1. Analysis of GHG emissions from construction of the proposed project.
2. Determination that the construction emissions from the project do not exceed the levels of construction emissions analyzed in the GGERP.
3. Incorporation of DWR's project-level GHG emissions-reduction strategies into the design of the project.
4. Determination that the project does not conflict with DWR's ability to implement any of the "Specific-Action" GHG emissions-reduction measures identified in the GGERP.
5. Determination that the project would not add electricity demands to the State Water Project system that could alter DWR's emissions-reduction trajectory in such a way as to impede its ability to meet its emissions reduction goals.

Consistent with these requirements, Appendix D, "Inventory and Calculation of Greenhouse Gas Emissions," demonstrates that the proposed project would meet each of the required elements and would be consistent with the GGERP.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

As described in the Air Quality section, the proposed project is a small construction project with no operational emissions. Short-term project-related construction activities would generate air pollutants, including GHGs, from the operation of construction equipment and vehicles. Construction is anticipated to be completed within one year. Proposed activities include site preparation (access road widening, vegetation/topsoil removal and stockpile), earthwork (excavation, fill, grading), installation of rock structures (buried rock weirs, channel riffles, valley grade control), and revegetation. Workers would commute to the project area in passenger vehicles, and construction materials and equipment would be transported to and from the project area by haul trucks. Construction equipment would include excavators, loaders, a grader, roller, bulldozer, water truck, water pump, and chainsaw. Emissions from construction equipment, as well as estimates of the energy that would be used during the construction

period, are summarized in Appendix D. It is estimated that the total construction activity emissions would be approximately 254.5 $mtCO_2e$. This quantity is several orders of magnitude lower than amount of GHG emissions for major facilities that are required to report GHG emissions under AB 32 and the federal Mandatory Greenhouse Gas Reporting Rule (25,000 metric tons of CO_2e/year).

CEQA Considerations

Refer to the Alternative A discussion. The proposed project would be in compliance with all applicable plans and policies and is consistent with the GGERP. Based on the analysis provided in the GGERP and the demonstration that the proposed project is consistent with the Inventory and Calculation of Greenhouse Gas Emissions (Appendix D), DWR, as the CEQA lead agency, has determined that the proposed project's incremental contribution to the cumulative impact of increasing atmospheric levels of GHGs would be less than cumulatively considerable and, therefore, less than significant. DWR would further reduce the proposed project's incremental contribution to the cumulative impact of increasing atmospheric levels of GHGs by implementing DWR's project-level GHG emissions-reduction best management practices (BMPs) for construction activities. Implementation of these BMPs would reduce GHG emissions from construction projects by minimizing fuel usage by construction equipment, reducing fuel consumption for transportation of construction materials, and reducing the amount of landfill material.

Avoidance, Minimization, and/or Mitigation Measures

Pre-Construction and Final Design BMPs

Pre-construction and Final Design BMPs are designed to ensure that individual projects are evaluated and their unique characteristics taken into consideration when determining if specific equipment, procedures, or material requirements are feasible and efficacious for reducing GHG emissions from the project. Of the 15 BMPs included in DWRs GGERP, the following will be implemented to the extent they are applicable and appropriate for the proposed project.

- **GHG 1.** Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project.
- **GHG 2.** Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines.
- **GHG 6.** Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours. Construction BMPs apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All projects are expected to implement all construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief (as applicable) and the variance is approved by the DWR CEQA Climate 18 Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the GGERP.

Construction BMPs

- **GHG 7.** Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by California Code of Regulations, Title 13, Section 2485, the State's airborne toxics control measure). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement.
- **GHG 8.** Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of

all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an air quality control plan prior to commencement of construction.

- **GHG 9.** Implement a tire inflation program on the job site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an air quality management plan prior to commencement of construction.
- **GHG 15**. Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution, minimize, to the extent possible, uses of public roadways that would increase traffic congestion.

Alternative B – No Action

Under the no action alternative Thompson Meadow would not be restored and there would not be an increase in emissions associated with construction activities. There would be no impact to GHG emissions.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with the Forest Plan.

4.2.9. Hazards and Hazardous Materials

Regulatory Setting

Hazardous materials, including hazardous substances and wastes, are regulated by many state and federal laws. Statutes govern the generation, treatment, storage and disposal of hazardous materials, substances, and waste, and also the investigation and mitigation of waste releases, air and water quality, human health, and land use. The primary federal laws regulating hazardous wastes/materials are the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA). The purpose of CERCLA, often referred to as “Superfund,” is to identify and clean up abandoned contaminated sites so that public health and welfare are not compromised. The RCRA provides for “cradle to grave” regulation of hazardous waste generated by operating entities. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order (EO) 12088, *Federal Compliance with*

Pollution Control Standards, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

California regulates hazardous materials, waste, and substances under the authority of the California Health and Safety Code and is also authorized by the federal government to implement RCRA in the State. California law also addresses specific handling, storage, transportation, disposal, treatment, reduction, cleanup, and emergency planning of hazardous waste. The Porter-Cologne Water Quality Control Act also restricts disposal of wastes and requires cleanup of wastes that are below hazardous

waste concentrations but could impact ground and surface water quality. California regulations that address waste management and prevention and clean up contamination include Title 22 Division 4.5 Environmental Health Standards for the Management of Hazardous Waste, Title 23 Waters, and Title 27 Environmental Protection. Worker and public health and safety are key issues when addressing hazardous materials that may affect human health and the environment. Proper management and disposal of hazardous material is vital if it is found, disturbed, or generated during project construction.

Affected Environment

The proposed project area consists of Thompson Meadow and its associated perennial, intermittent, and ephemeral channels. The project area is located on public lands managed by the USFS, PNF, Beckwourth Ranger District. Land use in the project area is designated Timber Resource Land (TRL) by the County of Plumas (Plumas County 2016).

The California Department of Forestry and Fire Protection (CAL FIRE) developed a ratings scale for determining the potential for wildland fires. This scale takes into account the type and amount of vegetation (fuel); climate conditions, such as temperature, wind, and humidity; and degree of slope and geographic conditions (topography). The project area is not in a location designated as a Very High Fire Severity Zone (CALFIRE 2009).

The lands immediately surrounding the proposed project area are used primarily for livestock grazing and dispersed recreation. Timber harvest and fuel reduction projects have and continue to take place adjacent to and in the vicinity of the meadow. Beckwourth is the nearest town/city and is located approximately 18 miles to the southeast of the project area. The city of Portola is located approximately 23 miles south of the project area. The closest public airport/airstrip is the Nervino Airport, approximately 13 air miles to the southeast of the project area.

The project area is not in an area that is listed as a hazardous materials cleanup site, pursuant to Government Code Section 65962.5(a)(4) (California Department of Toxic Substances Control 2016a).

Pursuant to Government Code Section 65962.5, the SWRCB GeoTracker (State Water Resources Control Board 2016) and the California Department of Toxic Substances Control (DTSC) EnviroStor (California Department of Toxic Substances Control 2016b) online databases were consulted on September 3, 2019, to determine if there are any recorded sites of concern within or near the project area. No sites of potential concern were identified in either GeoTracker or EnviroStor within the 3-mile search radius.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

Proposed construction and maintenance activities would involve the routine use, handling, and transport of hazardous substances, such as diesel fuels, gasoline, hydraulic fluids, and lubricants. The routine use, handling, storage, and transport of those hazardous materials constitute an inherent risk that could result in the exposure of workers to hazardous materials and, if those hazardous materials were accidentally released, become a hazard to the environment. Nonetheless, all hazardous materials would be used, stored, and transported according to standard procedures and protocols. In addition, implementation of a stormwater pollution and prevention plan, if needed, as well as adherence to issued regulatory permits (Section 401 Water Quality Certification from the RWQCB, a 404 permit from USACEUSACE, and if required, a LSAA from CDFW), would minimize or avoid the potential effects.

CEQA Considerations

Refer to the Alternative A discussion. The proposed project is not located on or in the vicinity of a known hazardous materials site per Government Code Section 65962.5 (DTSC 2016a). The project is not in the vicinity of an existing or proposed school, public or private airport, and/or airstrip. The project would not interfere with an emergency response plan and/or emergency evacuation plan or expose

people or structures to wildland fire-related hazards. The routine use, handling, storage, and transport of hazardous materials during construction would constitute an inherent risk that could result in the exposure of workers to hazardous materials and, if those hazardous materials were accidentally released, become a hazard to the environment. However, project design features related to fuel storage and use, the minimization of areas of disturbance, and adherence to appropriate permits would minimize or avoid adverse effects to water quality and the environment and would result in a less than significant impacts related to hazards and hazardous materials.

Alternative B – No Action

There would be no construction activities in the project area involving hazardous materials and waste, thus under the no action alternative there would be no effects.

Compliance with the Forest Plan and Other Direction

All potentially occurring hazardous materials encountered as a result of the proposed project would be handled and disposed of according to PNF, State, and federal laws and guidelines.

4.2.10. Noise

Regulatory Setting

Noise is defined as unwanted sound. Sound, traveling in the form of waves from a source, exerts a sound pressure level (referred to as sound level) which is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. An individual's noise exposure is a measure of noise over a period of time. A noise level is a measure of noise at a given instant in time. The time-varying characteristic of environmental noise is described using statistical noise descriptors.

Some land uses are considered more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, auditoriums, and parks and other outdoor recreation areas generally are more sensitive to noise than are commercial (other than lodging facilities) and industrial land uses.

There are no federal or State noise regulations that are applicable to the proposed project. The Plumas County General Plan (County of Plumas 2013) includes a noise element with a goal to establish and maintain a quiet and healthy environment, with land uses arranged and managed to reduce annoyance and complaints and minimize the exposure of community residents to excessive noise.

Affected Environment

The proposed project would require construction activities within PNF on the Beckwourth Ranger District, in an area located within Red Clover Valley. There are no residences, buildings, or recreational facilities in Red Clover Valley, but the area supports recreational and agricultural activities, such as hunting, mountain biking, off highway vehicles, and livestock grazing. The nearest sensitive receptors are residences 12 air miles south and southeast of the proposed project area. Access to the proposed project area would be along County Road 111 (Beckwourth-Genesee Road) and Forest Service Road 25N05.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

Construction is expected to occur during daylight hours, typically between 7:00 a.m. and 5:30 p.m., five days a week. Construction activities are expected to begin in mid-August 2020 and would be completed

no later than November 15, 2020. During construction of the proposed project, noise from construction activities may intermittently dominate the noise environment in the immediate area of construction. Noise generated by construction activities would be a function of the noise levels generated by individual pieces of construction equipment, the type and amount of equipment operating at any given time, the timing and duration of construction activities, and the proximity of nearby sensitive receptors.

For planning purposes, the Plumas County General Plan (County of Plumas 2013) includes the Governor's Office of Planning and Research noise compatibility guidelines by land use category. For existing residential uses, noise exposure of up to 60 dB is considered normally acceptable and noise exposure from 60 to 70 dB is considered conditionally acceptable. For agricultural uses, noise exposure of as much as 75 dB is considered normally acceptable, and noise exposure from 75 to 80 dB is considered conditionally acceptable

The proposed project would include earthwork, excavation, filling, grading, and revegetation. Construction equipment is expected to generate noise levels ranging from 70 to 90 dB at a distance of 50 ft., and noise produced by construction equipment would be reduced over distance at a rate of about 6 dB per doubling of distance (California Department of Transportation 2013) and attenuated further by surrounding vegetation. Construction impacts would be temporary in nature and sensitive receptors would not be exposed to construction noise, as there are no sensitive receptors near the project area. Therefore, implementation of the proposed project would not have an adverse impact with regard to noise.

CEQA Considerations

Refer to the Alternative A discussion. Project-related construction noise would be short-term and intermittent and would not occur in the vicinity of any sensitive receptors. The project area is not located within two miles of a public airport, public use airport, or private airstrip facilities. Impacts from project-related construction noise would be less than significant.

Alternative B – No Action

Under the no action alternative Thompson Meadow would not be restored, resulting in no increase in ambient noise levels associated with construction activities.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with the Forest Plan and adheres to Plumas County's General Plan noise element goal for construction noise within public facilities (used as a proxy for public lands).

4.2.11. Tribal Cultural Resources

Regulatory Setting

Refer to the Cultural Resources section for federal and State regulations applicable to Tribal Cultural Resources.

Affected Environment

Refer to the Cultural Resources section for the history of tribal consultation on the proposed project.

Environmental Consequences

Alternative A – Proposed Project (Federal Action)

Environmental effects of the proposed project on Tribal Cultural Resources would be the same as those described in the Cultural Resources section.

CEQA Considerations

Refer to the Alternative A discussion for Cultural Resources. Implementation of the proposed project would not adversely change historical or archaeological resources and is not anticipated to disturb human remains. Impacts to cultural resources would be less than significant and would be further reduced with implementation of the avoidance and minimization measures described below.

Avoidance, Minimization, and/or Mitigation Measures

- A Maidu tribal monitor and a qualified Forest Service approved archaeologist will be present during project implementation in proximity to culturally significant sites that are within or directly adjacent to the ADI.
- Standard protection measures including flagging and avoiding the portions of the sites outside of the ADI will be implemented.
- If unanticipated cultural resource materials are discovered during construction, all earth-moving activity within and around the immediate discovery area would cease until a qualified Forest Service approved archaeologist can assess the nature and significance of the find.
- If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the County Coroner contacted. Pursuant to PRC Section 5097.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC) who will then notify the Most Likely Descendent (MLD). Further provisions of PRC5097.98 are to be followed as applicable. The Plumas National Forest operates under a Forest specific Native American Graves and Repatriation Act (NAGRPA) protocol (2017) that will be utilized to immediately inform and engage Indian Tribes in the event of the discovery of Native American human remains or associated items outlined within NAGPRA, i.e. funerary objects, sacred objects and objects of cultural patrimony.

Alternative B – No Action

Under the no action alternative no effect to Tribal Cultural Resources would occur.

Compliance with the Forest Plan and Other Direction

The proposed project is in compliance with the Forest Plan and adheres to federal requirements for protection and management of Tribal Cultural Resources.

4.3 Mandatory Findings of Significance

CEQA Guidelines Section 15065 states that the lead agency shall find that a project may have a significant effect on the environment, and thus require that an environmental impact report (EIR) be prepared for the project, where there is substantial evidence, in light of the whole record, that any of the following conditions may occur:

- Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?
- Does the project have impacts that are individually limited but cumulatively considerable? (“Cumulatively considerable” meant that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of the other current projects and the effects of probable future projects)?
- Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Prior to commencement of the environmental analysis, when a project proponent agrees to mitigation measures or project modifications that would avoid any significant effect on the environment or would mitigate the significant environmental effect, a lead agency need not prepare an EIR solely because, without mitigation, the environmental effects would have been significant.

4.3.1 Environmental Consequences

Implementation of the proposed meadow restoration is expected to have a long-term beneficial impact to the environment, improving fish and wildlife habitat, wetland plant communities, and water quality. The proposed project is intended to restore the hydrological function of a montane meadow, improving stream conditions, enhancing aquatic and terrestrial habitats, and expanding the aerial extent of wet meadow habitat. The proposed project would not result in cumulatively considerable impacts (refer to Chapter 4.4, "Cumulative Impacts"). The proposed project would not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below a self-sustaining level, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory, or have environmental effects that would cause substantial adverse effects on human beings.

Best management practices, standard operating procedures, project design criteria, and project-specific mitigation measures described in this EA/IS would ensure that resources are protected and impacts under the proposed project would not have adverse effects

Cumulative Impacts

According to NEPA and CEQ regulations, "cumulative impacts" are the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions (40 CFR §1508.7). Similarly, CEQA Guidelines (Section 15355(b)) defines cumulative impacts as the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects.

The CEQA Guidelines and NEPA regulations require that the cumulative impacts of a proposed action be addressed in an environmental document when the cumulative impacts are expected to be significant (40 CFR 1508.25[a][2]; 14 California Code of Regulations [CCR] 15130[a]). When a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," the lead agency need not consider that effect significant, but should briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

This analysis relies on existing environmental conditions as a proxy for the impacts of past actions because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to the cumulative effects of the proposed action and alternative.

This cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. There are several reasons for not taking this approach. First, a catalog and analysis of all past actions would be impractical to compile and unduly costly to obtain. Existing conditions have been impacted by innumerable actions over the last century (and beyond), and trying to isolate the individual actions that continue to have residual impacts would be nearly impossible. Second, providing the details of past actions on an individual basis would not be useful to predict the cumulative effects of the proposed action or alternative. In fact, focusing on individual actions would be less accurate than looking at existing conditions, because there is limited information on the environmental impacts of individual past actions, and one cannot reasonably identify each and every action over the last century that has contributed to current conditions. Additionally, focusing on the impacts of past human actions risks ignoring the important residual effects

of past natural events, which may contribute to cumulative effects just as much as human actions. By looking at existing conditions, the analysis is sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. Finally, the CEQ issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states, "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA/IS is also consistent with Forest Service NEPA Regulations (36 CFR §220.4(f)) (July 24, 2008), which state, in part:

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

In determining cumulative effects, the past, present, and future actions displayed in Appendix C were considered while evaluating the direct and indirect effects of the proposed action and no action alternatives.

Alternative A- Proposed Project (Federal Action)

A summary of the cumulative analysis is included within the environmental consequences section for some resources (see Sections 4.2.1. through 4.2.11.). Based on the proposed project minimizing or avoiding potential adverse effects through use of standard construction/design practices, adherence to required permits, and mitigation measures, no effects were determined to be cumulatively considerable. A majority of potential effects would be temporary and would be avoided or greatly reduced with proper erosion control, construction methods, BMPs, and onsite revegetation. Sensitive biological resources within the surrounding area would likely benefit from restoration of the channel floodplain connection, as it would result in an increase of wet meadow habitat and improve riparian habitat conditions.

CEQA Considerations

Refer to the Alternative A discussion. The proposed project would not result in any adverse effects that, when considered in connection with other projects, would be cumulatively considerable.

Alternative B- No Action

Under the no action alternative, no cumulatively considerable effects are anticipated. No construction would occur, and the existing environmental condition would remain unchanged within the proposed project and surrounding area.

4.5 Federal Legal Regulatory Compliance and Coordination

The USFS operates under a diverse array of local, State, and federal management guidance and policy as well as various executive orders. Currently, the Beckwourth Ranger District is guided by the Plumas National Forest 1988 Land and Resource Management Plan (LRMP, USDA 1988a) as amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) supplemental EIS and ROD (USDA 2004 a,b).

4.5.1. Principal Federal Environmental Laws

National Environmental Policy Act

The CEQ regulations for implementing NEPA requires that federal agencies rigorously explore and objectively evaluate all reasonable alternatives and briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 Code of Federal Regulations [CFR] 1502.14). This environmental document meets the CEQ regulations requiring public scoping and a thorough analysis of issues, alternatives, and effects.

National Forest Management Act

The National Forest Management Act (NFMA) reorganized, expanded and otherwise amended the Forest and Rangeland Renewable Resources Planning Act of 1974, which called for the management of renewable resources on national forest lands. The NFMA Act requires the Secretary of Agriculture to assess forest lands and develop a management plan for each unit of the National Forest System. The USFS is complying with the provisions of this law by ensuring that the design of the project meets the Standards and Guidelines of the Plumas National Forest Land and Resource Management Plan (USDA 1988a) and its amendments.

Endangered Species Act

The Endangered Species Act of 1973 (16 USC 1531 et seq.) requires that any action authorized by a federal agency not be likely to jeopardize the continued existence of a threatened or endangered species (TES), or result in the destruction or adverse modification of habitat of such species that is determined to be critical. Section 7 of the ESA, as amended, requires the responsible federal agency to consult with the USFWS and NMFS concerning TES under their jurisdiction. It is USFS policy to analyze impacts to TES to ensure management activities are not likely to jeopardize the continued existence of a TES or result in the destruction or adverse modification of habitat of such species that is determined to be critical. This analysis is documented in a BA and two BEs. The BA and BEs include evaluation of potential effects to TES, terrestrial and aquatic wildlife, sensitive habitats, and sensitive plant species, and is summarized and incorporated by reference in Chapter 2.

Wildlife and Fisheries

The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973 was evaluated in the BA. A list of federal endangered and threatened species that may be affected by the project was received from the USFWS on November 14, 2018. No federally listed anadromous fish species occur in the Feather River watershed due to the downstream man-made impediment Lake Oroville, and thus no species list is necessary from the NMFS. Based on the analysis conducted in the BA for potential effects to TES, it was determined that the proposed project may affect, but is not likely to adversely affect the gray wolf or Sierra Nevada yellow-legged frog (SNYLF).

Botany

The USFWS list of federal endangered and threatened species that may be affected by the proposed project did not contain any plant species. The USFWS list is available in the project record and fulfills the requirements to provide a current species list pursuant to Section 7(c) of the ESA, as amended. No federally listed plant species are known to occur within the project area. No federally listed plants were

identified during botanical surveys. Therefore, the proposed project will result in no effect to federally listed plant species.

Consultation to Date

Based on the analysis conducted in the BA (USDA 2019b), it was determined the proposed project may affect but is unlikely to adversely affect the gray wolf or SNYLF. Therefore, the USFS requested informal consultation with the USFWS on March 22, 2019 (USDA 2019b). The USFWS responded on May 9, 2019 concurring with the findings in the BA. This conclusion was based on the following: 1) implementation of conservation measures would minimize disturbance to wolves, 2) SNYLF was not detected in the project area, and 3) the presence of aquatic predators reduced the potential for SNYLF to occur within the project area (USFWS 2019). The USFWS concluded, "Unless new information reveals effects of the proposed action that may affect listed species in a manner or to an extent not considered, or a new species or critical habitat is designated that may be affected by the proposed action, no further action pursuant to the Endangered Species Act is necessary" (Ibid).

Clean Water Act

The Clean Water Act was adopted to protect the quality of the nation's surface waters. Section 208 of the Clean Water Act (CWA) required the States to prepare non-point source pollution plans, which were to be certified by the State and approved by the U.S. Environmental Protection Agency (EPA). In response to this law and in coordination with the State of California Water Resources Control Board (SWRCB) and EPA, USFS Region 5 (Pacific Southwest Region) began developing BMPs for water quality management planning on National Forest System lands within the State of California in 1975. State of California Water Resources Control Board Resolution #68-16 (SWRCB, 1968) directs that high quality water or water of higher quality than required by regulation be maintained at that higher quality. Similarly anti-degradation EPA policy 40 C.F. R. Section 131.12 states that existing water quality, even when it exceeds required levels for stated beneficial uses will be maintained.

Under Section 404 of the CWA, USACE regulates the discharge of dredged or fill material into waters of the U.S. Waters of the U.S. are those waters that have a connection to interstate commerce, either directly via a tributary system or indirectly through a nexus identified in the USACE regulations. In non-tidal waters, the lateral limit of jurisdiction under Section 404 extends to the ordinary high water mark (OHWM) of a water body or, where adjacent wetlands are present, beyond the OHWM to the limit of the wetlands. The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area" (33 CFR 328.3).

Under Section 401 of the CWA, the SWRCB must certify all activities requiring a 404 permit. The RWQCB regulates these activities and issues water quality certifications for those activities requiring a 404 permit. In addition, the RWQCB has authority to regulate the discharge of "waste" into waters of the State pursuant to the Porter-Cologne Water Quality Control Act. RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA and regulating discharges to ensure compliance with the water quality standards. Details about water quality standards in a project area are included in the applicable RWQCB Basin Plan. In addition, the SWRCB identifies waters failing to meet standards for specific pollutants. These waters are then state-listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source or non-point source controls, the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed. The proposed project is a tributary to the East Branch of the North Fork Feather River (NFFR). The NFFR has been placed on the Section 303(d) list for mercury, polychlorinated biphenyls, high water temperature, and

unknown toxicants. To date no TMDL's have been listed by the EPA for the NFFR below Lake Almanor (EPA, 2016).

Potential effects of the proposed project, either through surface runoff of sediment and chemicals, or chemicals entering water bodies through groundwater sources do not constitute a significant degradation of quality or impair existing beneficial uses. The proposed project adheres to the CWA by implementing BMPs that are consistent with the Soil and Water Conservation Handbook (USDA 2011a), the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA, 2012a), and the Pacific Southwest Region (Region 5) Supplement No. 2500-2012-1 for Soil Management (USDA, 2012b). In addition, proper construction BMPs for erosion and pollutant control would be implemented as required by the RWQCB. The USFS would be required to obtain Section 401 (RWQCB) and 404 (USACE) permits for the proposed project work within jurisdictional waters of the U.S.

Clean Air Act

The Clean Air Act (CAA) provides the principal framework for national, state, and local efforts to protect air quality. Under the CAA, the EPA's Office of Air Quality Planning and Standards is responsible for setting standards for pollutants which are considered harmful to people and the environment. The EPA promulgated the General Conformity Rule on November 30, 1993 in Volume 58 of the Federal Register (58 FR 63214) to implement the conformity provision of Title I, section 176(c)(1) of the CAA. Section 176(c)(1) requires that the federal government not engage in, support, or provide financial assistance for licensing, permitting, or approving any activity not conforming to an approved CAA implementation plan. The approved implementation plan could be a federal, state, or tribal Implementation Plan (i.e., FIP, SIP, or TIP). The General Conformity Rule is codified in Title 40 of the Code of Federal Regulations (CFR) Part 51, Subpart W and Part 93, Subpart B, "Determining Conformity of General Federal Actions to State or Federal Implementation Plans." The General Conformity Rule applies to all federal actions except highway and transit programs. The latter must comply with the conformity requirements for transportation plans in 40 CFR Part 93, Subpart A.

The MCAB is the local air district with authority within the proposed project area. The district regulates air quality through its permit authority over most types of stationary emissions sources through planning and review activities. The proposed project involves restoring the hydrologic function of a meadow floodplain in Plumas County. Plumas County is in attainment for all current National Ambient Air Quality Standards; therefore, conformity requirements do not apply. Project-related emissions of criteria pollutants during short-term construction activities would not expose any sensitive receptors to substantial pollutant concentrations, result in air pollutant standard violations, or conflict with MCAB air quality plans.

National Historic Preservation Act

The NHPA of 1966, as amended, sets forth national policy and procedures for historic properties, defined as districts, sites, buildings, structures, and objects included in or eligible for listing in the NRHP. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and to allow the Advisory Council on Historic Preservation the opportunity to comment on those undertakings, following regulations issued by the Advisory Council on Historic Preservation [36 Code of Federal Regulations (CFR) 800]. The project has complied with Section 106 of the NHPA.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits actions that will result in "take" of migratory birds, their eggs, feathers, or nests. "Take" is defined in the MBTA as any means or any manner to hunt, pursue, wound, kill, possess, or transport, any migratory bird, nest, egg, or part thereof. Migratory birds are also protected, as defined in the MBTA, under Section 3513 of the California Fish and Game Code. The

proposed project would not result in impacts to migratory birds through implementation of avoidance measures and pre-construction nesting bird surveys.

4.5.2. Federal Executive Orders

Consultation and Coordination with Indian Tribal Governments, Executive Order 13175 of November 6, 2000

Executive Order 13175 establishes the requirement for federal governments to engage in regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, to strengthen the government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes. Executive Order 13175 reaffirms the federal government's commitment to tribal sovereignty, self-determination, and self-government. Its purpose is to ensure that all Executive departments and agencies consult with Indian tribes and respect tribal sovereignty as they develop policy on issues that impact Indian communities. The Forest Service has closely consulted with Indian tribes and Native American organizations regarding this project and will continue tribal coordination throughout implementation.

Indian Sacred Sites, Executive Order 13007 of May 24, 1996

Executive Order 13007 is designed to protect and preserve Indian religious practices. It directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. No Traditional Cultural Properties, sacred sites, or locations with specific religious associations were identified through research or consultation efforts for this project.

Invasive Species, Executive Order 13112 of February 3, 1999

Executive Order 13112 created the Invasive Species Council (ISC) in order to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological and human health impacts that invasive species cause. Federal agencies are required to:

- Identify actions that may affect the status of invasive species
- Use relevant programs and authorities to prevent the introduction, control and monitoring of invasive species
- Provide for native species restoration as well as their habitats
- Promote public information
- Not condone or carry out actions that may spread invasive species
- Consult with the ISC and other stakeholders as appropriate

The following Standard Management Requirements (SMRs) were developed with the direction provided by the Invasive Species Management section of the Forest Service Manual (USDA 2011). The implementation of SMRs would reduce the potential to introduce invasive species to new areas and spread existing infestations. Implementing these actions would ensure the proposed project would be in compliance with EO 13112:

- Cleaning off-road equipment – require all off-road equipment and vehicles (Forest Service, DWR and contracted) used for project implementation to be free of weeds.
- Clean all equipment and vehicles of all mud, dirt, and plant parts. This would be done at a vehicle washing station or steam-cleaning facility before the equipment and vehicles enter the project area. Cleaning is not required for vehicles that would stay on the roadway. Also, all off-road equipment must be cleaned prior to leaving areas infested with noxious weeds. All off-road equipment must be cleaned prior to leaving designated weed units if weeds are present at the time of implementation and are unable to be avoided.

- Staging Areas – do not stage equipment, materials, or crews in areas infested with invasive plant species where there is a risk of spread to uninfested areas.
- Road construction, reconstruction, and maintenance – all earth-moving equipment, gravel, fill, or other materials would be free of invasive plants and propagules. Use onsite sand, gravel, rock, or organic matter where possible.
- Revegetation – Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless invasive species are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with invasive species. All activities that require seeding or planting will need to use only locally collected native seed sources. Plant and seed material should be collected from as close to the project area as possible, from within the same watershed, and at a similar elevation whenever possible. Persistent non-native species such as timothy, orchard grass, or ryegrass should be avoided. Site-specific revegetation and seeding guidelines will be developed or customized from existing general guidelines as necessary by Plumas National Forest botanists.

Floodplain Management, Executive Order 11988 of May 24, 1977 and Protection of Wetlands, Executive Order 11990 of May 24, 1977

Executive Orders 11988 and 11990 require federal agencies to avoid, to the extent possible, short- and long-term effects resulting from the occupancy and modification of flood plains and the modification or destruction of wetlands. These executive orders are intended to preserve the natural and beneficial values served by floodplains and wetlands.

The purpose of the proposed project is to restore the natural functions of meadow floodplain, by reconnecting the entrenched eroding stream channel to the meadow floodplain, which will allow the stream to spill out onto the meadow more frequently. This in turn will restore and increase the aerial extent of wetlands in the meadow. The proposed project meets the above stated executive orders by implementing BMPs that are consistent with the Soil and Water Conservation Handbook (USDA 2011a), the National Best Management Practices for Water Quality Management on National Forest System Lands (USDA, 2012a), and the Pacific Southwest Region (Region 5) Supplement No. 2500-2012-1 for Soil Management (USDA, 2012b). By using BMPs, the proposed project meets the executive orders according to the SNFPA ROD (USDA 2004b, Section VII). In addition, proper construction BMPs for erosion and pollutant control will be utilized during construction as required by the RWQCB.

Environmental Justice, Executive Order 12898 of February 11, 1994

Executive Order 12898 requires that federal agencies make achieving environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies and activities on minority and low-income populations. Low-income and minority populations are not within the vicinity of the proposed project, and activities associated with the project are not anticipated to discriminate against these population types. Proposed activities would not adversely affect community, social, economic and health and safety factors. Public scoping was conducted in accordance with NEPA regulations to identify any potential issues or hazards associated with the proposed project.

4.5.3. Special Area Designations

The proposed project will need to comply with laws, regulations and policies that pertain to the following special areas:

Research Natural Areas

There are no Research Natural Areas within the vicinity of the proposed project area and no adverse effects are anticipated.

Wilderness Areas

There are no designated Wilderness Areas within the proposed project area. The nearest Wilderness Area is the Bucks Lake Wilderness, located within the Plumas National Forest south of SR 70 and near the community of Belden (USDA 2000). The 23,710-acre Bucks Lake Wilderness is approximately 35 miles west of the Thompson Meadow project. The Bucks Lake Wilderness is managed to maintain and protect wilderness characteristics and values in accordance with the Wilderness Act of 1964. Five wilderness characteristics must be considered when management activities have the potential to affect wilderness character in a proposed project. Four of these wilderness characteristics are from Section 2 (c) of the Wilderness Act of 1964: untrammeled, natural, undeveloped, and outstanding opportunities for solitude or a primitive and unconfined type of recreation. There is a fifth quality; the unique qualities of a particular wilderness area, which is used to monitor wilderness character although it is not derived from the Wilderness Act of 1964. The proposed project area is located outside of the Bucks Lake Wilderness and it is not anticipated that any of the five wilderness characteristics (opportunities for solitude, untrammeled, natural, undeveloped, or unique qualities of the Bucks Lake Wilderness) would be negatively impacted under the proposed action.

Inventoried Roadless Areas

There are no Inventoried Roadless Areas (IRA) within the project area, with the nearest located immediately northwest of the Bucks Lake Wilderness, and north of SR 70 (USDA 2000). USFS direction for management of IRAs is to provide lasting protection and to maintain the roadless characteristics which consist of 1) high quality or undisturbed soil, water, and air; 2) sources of public drinking water; 3) diversity of plant and animal communities; 4) habitat for threatened, endangered, proposed, candidate, and sensitive species and for those species dependent on large, undisturbed areas of land; 5) primitive, semi-primitive non-motorized and semi-primitive motorized classes of dispersed recreation; 6) reference landscapes; 7) natural appearing landscapes with high scenic quality; 8) traditional cultural properties and sacred sites; and 9) other locally identified unique characteristics. A Ninth Circuit Court decision (Lands Council v Martin 2008), also directs the USFS to consider the effects of activities within these areas on the potential for designation as wilderness areas.

Wild and Scenic Rivers

There are no designated Wild and Scenic Rivers within the project area. A reach of the Middle Fork Feather River (MFFR) is designated as Wild and Scenic, approximately 18 miles southwest of the project area. In addition, a reach of the NFFR is eligible and deemed to have potential for inclusion in the Wild and Scenic River System. In accordance with management direction outlined in a memorandum to District Rangers dated May 8, 2001, all planned Forest Service Management activities within 1/4 mile of both sides of the river's bank need to be consistent with management direction for Wild and Scenic Rivers until a suitability determination is made through the land management planning process. The proposed meadow restoration would not have an adverse effect on the MFFR or proposed eligible reaches on the NFFR. Under the proposed action there would not be any adverse effects on the outstandingly remarkable values or the free-flowing condition of the eligible reaches of the NFFR currently managed as a Wild and Scenic River. There are no known past, present or reasonably foreseeable future projects within these areas that when considered with the proposed action would contribute to adverse cumulative impacts on the Wild and Scenic River System.

Municipal Watersheds (FSM 2540)

There are no Municipal Watersheds in the vicinity of the proposed project area and no adverse effects are anticipated.

4.6 Consultation and Coordination

Early and continuing coordination with the general public and appropriate public agencies is an essential part of the environmental process. It helps planners determine the necessary scope of

environmental documentation and the level of analysis required, and to identify potential impacts and mitigation measures and related environmental requirements. Agency consultation and public participation for this project have been accomplished through a variety of formal and informal methods, including project team meetings between USFS and DWR and interagency coordination meetings. This chapter summarizes the results of efforts to fully identify, address, and resolve project-related issues through early and continuing coordination.

Federal Endangered Species Act (FESA) Consultation Summary

An official species list was requested and downloaded from the USFWS on November 14, 2018. The proposed project does not have secured funding for implementation; however, State, federal and/or private funds may be sought to fund project construction and post-implementation monitoring. The USFS has assumed responsibilities under the ESA of 1973 (16 U.S.C. 1531 et seq). Based on the analysis conducted in the BA (USDA 2019b), it was determined the proposed project may affect but is unlikely to adversely affect the gray wolf or SNYLF. The USFS requested informal consultation with the USFWS on March 22, 2019 (USDA 2019b). The USFWS responded on May 9, 2019 concurring with the findings in the BA. The proposed project area is outside of the known range of federally listed plant species (USDA 2019e). There are no designated critical habitats within the project area (USDA 2019b and 2019e).

Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect federally listed species and designated critical habitat under their jurisdiction. There is a total barrier to anadromous fish at the Oroville Dam, and as a result the NFFR does not have anadromous fish species associated with it; therefore, the proposed project would have no effect on species under NMFS jurisdiction.

California Endangered Species Act (CESA) Consultation Summary

Prior to field surveys, DWR and USFS conducted a CNDDB search of the project limits and surrounding area. CESA-listed species occurring within the vicinity of the proposed project were addressed under FESA.

California Department of Fish and Wildlife (CDFW)

A proposed project scoping document was mailed to CDFW on November 6, 2017. No wildlife issues were raised and no correspondence has occurred since with regard to the proposed project.

Federal Wetlands and Other Waters Coordination Summary

A wetland delineation report to facilitate preliminary jurisdictional determination by the USACE Sacramento Regulatory Office was prepared by the project team in April 2018. Coordination with USACE for the Jurisdictional Determination of aquatic features within the proposed project area is currently in progress. Future coordination will include the need for a Section 404 permit based on temporary and permanent impacts to stream channels within the project area.

Cultural Resources Consultation Summary

Consultation with federally recognized Indian tribes, local Native American communities and/or interested parties was initiated in accordance with the First Amended Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region – 2018 (USDA 2018), Section 106 National Historic Preservation Act, and other laws and regulations. The USFS mailed formal tribal NHPA Section 106 consultation letters on February 17, 2017 to the Greenville

Rancheria, Susanville Indian Rancheria, Washoe Tribe of California and Nevada, and the Maidu Summit Consortium. Formal tribal NEPA Scoping consultation letters were also mailed on November 7, 2017 to the Greenville Rancheria, Susanville Indian Rancheria, Washoe Tribe of California and Nevada, and the Maidu Summit Consortium. In compliance with Section 106 of the NHPA and under the provisions of the PA, the Forest Service consulted on the proposed project with the California State Historic Preservation Officer on April 05, 2019.

Due to the complex and important cultural resources in the vicinity of the project area, additional efforts were made by the USFS to keep tribal entities informed and involved. On July 11, 2017, USFS archeologists and the Beckwourth District Ranger attended the Washoe Cultural Advisory Council meeting in Gardnerville, NV to discuss the proposed project. Washoe tribal representatives and PNF archeologists, including the Tribal Historic Preservation Officer (THPO), traversed the project area on July 18, 2017. Representatives from the Greenville Rancheria and the Susanville Indian Rancheria, including the latter tribe's THPO, met with PNF archeologists at the project area on September 13, 2017. All tribal representatives at these site visits agreed that a tribal monitor was desired during Project implementation in proximity to culturally significant sites within or adjacent to the project area of direct impact.

Consistent with its Tribal Engagement Policy and the California Natural Resources Agency's Tribal Engagement Policy, DWR mailed tribal consultation letters on February 12, 2018 to the Greenville Rancheria, Susanville Indian Rancheria, and Washoe Tribe of California and Nevada. To date, no comments have been received.

Draft Environmental Document

Scoping letters describing the proposed action and apprising the current preparation of an Environmental Assessment and Initial Study with Proposed Mitigated Negative Declaration (EA/IS) by USFS and DWR were distributed on November 6th, 2017 by the USFS to various agency stakeholders, organizations, and individuals of the public within the vicinity of the proposed project in accordance with 36 CFR Subparts A and B.

This EA/IS was made available for public and agency review and comment for 30 days, beginning on January 8, 2020. USFS and DWR ensured that the document was made available to all appropriate parties and agencies, including the following: 1) Responsible agencies; 2) Trustee agencies that have resources affected by the project; 3) other State, federal and local agencies which have regulatory jurisdiction, or that exercise authority over resources which may be affected by the project; and 4) the general public.

Copies of this document are available online at http://www.fs.usda.gov/project/?project=52760. The document is also available for review at the Beckwourth Ranger District, 23 Mohawk Road, Blairsden, CA 96103.

If you have questions, would like to request a hard copy of the EA/IS, or need additional information about this proposal or the comment procedures, please contact Katherine Carpenter, Forest Environmental Coordinator at 530-283-7742; email: katherine.carpenter@usda.gov or Joe Hoffman, Forest Hydrologist at 530-283-7868; email: joseph.hoffman@usda.gov.

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References

CDFG (California Department of Fish and Game). 2005. California Department of Fish and Game and California Interagency Wildlife Task Group. California Wildlife Habitat Relationships (CWHR) version 8.1. personal computer program. Sacramento, California. On-Line version. http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.asp. (Accessed: January 3, 2008).

California Department of Water Resources. 2019. Baseline Fish and Wildlife Monitoring Report: Thompson Meadow Restoration and Water Budget Evaluation Project. Office Report. April, 48 pp.

California Department of Water Resources. 2019. Strategic Plan. https://water.ca.gov/-/media/DWR-Website/Web-Pages/About/Files/Publications/DWR-Strategic-Plan-2018_1019_v1_a_y19.pdf

Cawley, K. 1990. "Black Mountain/Granite Mudflow." Forest Service Memo to Milford District Ranger, Milford CA.

CEQ. 1971. “Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act,” Office of the President, 40 CFR Parts 1500-1508.

Cornwell, K. and K. Brown. 2008. “Physical and Hydrological Characterization of Clark’s Meadow.” California State University, Sacramento.

CVRWQCB. 1998. The Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board Central Valley Region, Sacramento and San Joaquin River Basins. Fourth Ed., revised 2016. California Regional Water Quality control Board Central Valley Region, Sacramento, CA. Available online at http://www.waterboards.ca.gov/centralvalley/

Essaid, H. and B. Hill. 2014. “Watershed-scale modeling of streamflow change in incised montane meadows.” Water Resources Research, Vol. 50: 2657-2678.

Feather River Coordinated Resource Management (FRCRM). 2013. Red Clover and Last Chance Creeks Stream Monitoring Report, Plumas Corporation, 32 pp.

Freeman, G. 2010. “Tracking the Impact of Climate Change on Central and Northern California’s Spring Snowmelt Subbasin Runoff.” Western Snow Conference 2010.

Hammersmark, C., M. Rains, and J. Mount. 2008. “Quantifying the hydrological effects of stream restoration in a montane meadow, northern California, USA. River Research and Applications, Vol. 24(6), 735-753.

Hill, Mary. 2006. Geology of the Sierra Nevada. University of California Press. Berkeley and Los Angeles, CA.

Hoffman, J., K. Roby, and B. Bohm. 2013. “Effects of meadow restoration on stream flow in the Feather River watershed.” USDA Forest Service, Plumas National Forest, Quincy, CA.

Hoffman, J. 2011. “Investigation of 2011 erosion on Red Clover meadow restoration project.” USDA Forest Service, Plumas National Forest, Quincy, CA.

Hunt, L., J.Fair and M.Odland. 2018. “Meadow Restoration Incrases Base Flow and Groundwate Storage in the Sierra Nevada Mountains of California.” Journal of the American Water Resources Association, Vol.54, No. 5, pp. 1127-1136.

Loheide, S.P. II and Gorelick, S.M. 2005. "A local-scale, high-resolution evapotranspiration mapping algorithm (ETMA) with hydroecological applications at riparian meadow restoration sites." Remote Sensing of the Environment, Vol. 98, 182-200.

Loheide, S.P. II and Gorelick, S.M. 2007. "Riparian hydroecology: a coupled model of the observed interactions between groundwater flow and meadow vegetation patterning." Water Resources Research, Vol. 43, W07414.

Lundquist, D. and B. Dolman. 2016. "Beaver in California: Creating a Culture of Stewardship." Occidental Art and Ecology Center Water Institute.

McMahon, A. 2013. "Created ponds as indicators of restored Sierra Nevada meadow hydrology." MS Thesis. University of Nevada, Reno. Reno, NV.

Ohara, N., M.L. Kavvas, Z.Q. Chen, L. Liang, M. Anderson, J. Wilcox, and L. Mink. 2013. "Modeling atmospheric and hydrologic processes for assessment of meadow restoration on flow and sediment in a sparsely gauged California watershed." Hydrologic Processes, Vol 28: 3053-3066.

Plumas Corporation. 2010. "Red Clover/McReynolds Creek Restoration Project Monitoring Report 2009." Feather River Coordinated Resource Management Group. Quincy, CA.

Sawyer, John O., T. Keeler-Wolf, and J. Evans. 2009. A Manual of California Vegetation, 2nd edition. California Department of Fish and Game. California Native Plant Society. California Native Plant Society Press. Sacramento, CA.

Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. SVP Impact Mitigation Guidelines Revision Committee.

State of California Department of Water Resources (DWR). 1946. "Indian Creek Adjudication: Report on Water Supply and Use of Water on Indian Creek Stream System in Plumas County, California."

State of California Department of Water Resources (DWR). 1964-1975. "Bulletin No. 130-70, Hydrologic Data Volume II: Northeastern California."

State of California Natural Resources Agency. 2014. "California Water Action Plan."

State of California Water Resources Control Board (SWRCB). 2011. "Complaints against Feather River Coordinated Resources Management Group in Plumas County. 3 pp.

Superior Court of the State of California in and for the County of Plumas. 1950. "In the Matter of the Determination of the Rights of the Various Claimants to the Water of Indian Creek Stream System in Plumas County, California."

Tague, C., S. Valentine, and M. Kotchen. 2008. "Effect of geomorphic channel restoration on streamflow and groundwater in a snowmelt-dominated watershed." Water Resources Research, Vol. 44, W10415.

Taylor, D. and M. Tuttle. 2007. Water for Wildlife – A Handbook for Ranchers and Range Managers. Bat Conservation International. www.batcon.org

Thompson, D.M. 2002. "Long-Term Effect of Instream Habitat-Improvement Structures on Channel Morphology Along the Blackledge and Salmon Rivers, Connecticut, USA." Environmental Management, Vol. 29, No. 1, pp. 250-265.

US Army Corps of Engineers (USACE). 2016. "HEC-RAS River Analysis System: Hydraulic Reference Manual: Version 5.0." Davis, CA.

USDA. 1988. Plumas National Forest Land and Resource Management Plan. USDA Forest Service Plumas National Forest, Quincy, CA.

USDA. 1988b. Cumulative Off-site Effects Analysis, Interim Directive No. 1. Soil and Water Conservation Handbook. FSH.2509.22, Chapter 20. San Francisco: USDA Forest Service.

USDA. 2000. Water Quality Management for Forest System Lands in California: Best Management Practices. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA. 2004. Record of Decision Sierra Nevada Forest Plan Amendment. USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA. 2010. Forest Service Manual 2550 Soil and Water Resources. Washington D.C.: USDA Forest Service.

USDA. 2011. "Region 5 Ecological Restoration: Leadership Intent." USDA Forest Service Pacific Southwest Region, Vallejo, CA.

USDA. 2012. National Best Management Practices for Water Quality Management onpp. National Forest System Lands, Volume 1: National Core BMP Technical Guide. FS-990a. USDA Forest Service, Washington D.C.

USDA 2015. "Effects of Meadow Erosion and Restoration on Groundwater Storage and Baseflow in National Forests in the Sierra Nevada, CA." USDA Forest Service, Pacific Southwest Region, 59 pp.

USDA. 2017. Forest Service Manual 2500, Chapter 2550--Soil Management Supplement, Pacific Southwest Region (R5), Vallejo, CA.

USDA. 2018. First Amended Programmatic Agreement Among the U.S.D.A. Forest Service, Pacific Southwest Region (Region 5), California State Historic Preservation Officer, Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Process for Compliance with Section 106 of the National Historic Preservation Act for Management of Historic Properties by the National Forests of the Pacific Southwest Region – 2018.

USDA. 2018b. Determination of National Register of Historic Places Eligibility and Finding of Effect for Two Pre-Contact Archaeological Sites (FS 05115101044 and FS 05115101049) at Thompson Meadow, Plumas County, California. Beckwourth Ranger District, Plumas National Forest. Prepared by Daniel Elliott and Jamie Moore, Plumas National Forest.

USDA 2019a. Biological Evaluation for Terrestrial and Aquatic Wildlife Species. USDA Forest Service, Plumas National Forest, Quincy, CA.

USDA 2019b. Biological Assessment for: Sierra Nevada Yellow-legged Frog, Gray Wolf, Pacific Fisher. USDA Forest Service, Plumas National Forest, Quincy, CA.

USDA 2019c. Project Management Indicator Species Report. USDA Forest Service, Plumas National Forest, Quincy, CA.

USDA 2019d. Project Migratory Landbird Conservation Report. USDA Forest Service, Plumas National Forest, Quincy, CA.

USDA 2019e. Biological Assessment/Evaluation of Rare and Sensitive Plant Species. USDA Forest Service, Plumas National Forest, Quincy, CA

USDA 2019f. Hydrology and Soils Report. USDA Forest Service, Plumas National Forest, Quincy, CA

US Department of Transportation (USDOT). Federal Highway Administration. 2005. "Hydraulic Engineering Circular No. 15, Third Edition: Design of Roadside Channels with Flexible Linings." Publication No. FHWA-NHI_05-114.

United States Environmental Protection Agency. 1986. Quality Criteria for Water 1986. Office of Water Regulations and Standards. EPA 440/5-86-001. Washington D.C.

Wood, S.H. 1975. Holocene Stratigraphy and Chronology of Mountain Meadows, Sierra Nevada, California. Earth Resource Monograph Number 4. USDA Forest Service, Region 5. San Francisco. 180 p.

Appendix A Mitigation, Monitoring, and Reporting Program for CEQA

THOMPSON MEADOW RESTORATION AND WATER BUDGET EVALUATION PROJECT
Mitigation, Monitoring, and Reporting Program

Introduction

This mitigation monitoring and reporting program (MMRP) was prepared by Plumas Corporation for the U.S. Forest Service Plumas National Forest (PNF) and California Department of Water Resources (DWR) for the Thompson Meadow Restoration and Water Budget Evaluation Project (Project). The Environmental Assessment/Initial Study (EA/IS) and mitigated negative declaration for this project include a series of mitigation measures to reduce potential environmental impacts during project construction and maintenance to less than significant levels. Those mitigation measures are incorporated into this MMRP and are listed in Table 1.

Legal Requirements

Under CEQA, public agencies are not to approve projects, as proposed, if there are feasible alternatives or feasible mitigation measures available that would substantially lessen the significant environmental effects of such projects (California Public Resources Code [PRC] 21002). Furthermore, California PRC Section 21081.6 states:

- The public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation.
- The monitoring program must be adopted when a public agency makes its findings under CEQA. The program must be designed to ensure compliance with mitigation measures during project implementation.

NEPA does not require federal agencies to adopt a monitoring program for mitigation measures.

Authorities and Responsibilities

PNF and DWR will have the primary responsibility for monitoring the implementation of mitigation measures identified in the MMRP. Both agencies have the authority to stop any activity associated with the project if the activity is determined to be a deviation from the approved project or the adopted mitigation measures. PNF and DWR may mutually agree to delegate responsibility for monitoring to other agencies or consultants, and will ensure that the delegated person(s) is qualified to monitor compliance.

Implementation and Compliance Approval Process

Table 1 lists the mitigation measures identified in the EA/IS, DN, and MND. Table 1 also identifies the party or parties responsible for ensuring implementation of the mitigation measure and the timing of mitigation measure implementation. Table 2 lists the project performance measures identified by PNF and DWR for verifying project effects, the responsible party for accomplishing the monitoring, and the time period in which the project performance monitoring will be conducted.

Summary of Monitoring Requirements

Based on the findings of the EA/IS and MND, implementation of the Thompson Meadow Restoration and Water Budget Evaluation Project would have no impact or a less than significant impact on the following resources:

- Aesthetics
- Energy
- Land Use and Planning
- Noise
- Population and Housing
- Recreation
- Utilities and Service Systems
- Agricultural and Forest Resources
- Environmental Justice
- Mineral Resources
- Paleontology
- Public Services
- Transportation
- Wildfire

Implementation of the Project would result in a potentially significant impact on the following resources:

- Air Quality
- Cultural Resources
- Greenhouse Gas Emissions/Climate Change
- Hydrology and Water Quality
- Biological Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Tribal Cultural Resources

However, all potentially significant impacts would be minimized to less than significant levels through implementation of the mitigation measures identified in Table 1.

Table 1. Draft Mitigation, Monitoring, and Reporting Program for the Thompson Meadow Restoration and Water Budget Evaluation Project.

Resource	Description of Measure	Implementing Responsibility	Timing
Air Quality			
	• All construction equipment shall be maintained in proper tune according to manufacturer's specifications.	PNF and DWR construction contractor	During construction

	• To the extent feasible, the use of diesel construction equipment meeting current CARB certification standards for off-road heavy-duty diesel engines shall be maximized. • Unnecessary vehicle idling shall be restricted to 5 minutes or less. • All off-road heavy-duty diesel equipment greater than 50 horsepower used in execution of the Project shall be registered with the Air Resources Board's Diesel Off-Road Online Reporting System (DOORS) and meet all applicable standards for replacement and/or retrofit. • All portable equipment used in the execution of Project construction, including generators and air compressors rated over 50 brake horsepower, shall be registered in the Portable Equipment Registration Program.		
Biological Resources – Special-Status Wildlife			
Sierra Nevada yellow-legged frog	• Construction activities would occur during the dry time of the year when stream flow in Thompson Creek is at its lowest, and reproductive cycles for most aquatic species have reached the dispersal stage, from mid-August through mid-November. • Amphibian surveys for Sierra Nevada yellow-legged frog would be conducted between June and August in the project area and 0.25 mile upstream and downstream of the project area prior to project implementation by a Forest Service approved biologist. Should any Sierra Nevada yellow-legged frogs be located before or during implementation, the USFWS would be notified and consulted. Project operations would cease	PNF and DWR	Prior to Construction

	and additional protective measures would be taken before re-convening any project activities.		
Gray wolf	• One month prior to commencement of construction activities, CDFW and the USFWS would be notified to determine if there is gray wolf activity near the Project area. • If an active wolf den or rendezvous site is located within 1 mile of the Project area prior to or during project activities, a limited operation period (LOP) restricting all noise or smoke generating activities shall be instated from April 1 through July 15. Coordination would continue with CDFW and the USFWS to determine any LOP modifications.	PNF and DWR PNF and DWR will consult with CDFW and USFWS	Prior to Construction and During Construction
Pacific fisher	• If fisher were detected prior to or during project work, appropriate LOPs would be implemented to protect denning.	PNF and DWR PNF and DWR will consult with CDFW and USFWS	Prior to Construction and During Construction
Other special-status wildlife species, including southern long-toed salamander, white-tailed jackrabbit, American badger	• Should any special-status species be located during project activities, a Forest Service approved biologist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.	PNF, DWR, construction contractor, and construction personnel	Prior to Construction and During Construction
Mountain sucker	• Prior to construction in each treatment reach, flowing water would be diverted around the treatment area to protect water quality and downstream aquatic life. Native fish, including the mountain sucker, as well as non-native fish, would be removed from each work area just after water diversion, using a backpack electro-shocker. The fish would be transported to the nearest area with adequate suitable habitat.	PNF and DWR construction contractor	Prior to Construction

Raptors, including northern goshawk, American peregrine falcon, California spotted owl, bald eagle, Swainson's hawk, northern harrier	• Trees with existing raptor nests would be left on the landscape. • Prior to the initiation of project construction activities occurring during the bird nesting season (February 15th through September 1st), the entire project area would be surveyed by a Forest Service approved biologist. If special-status bird nests are found during pre-construction surveys, the areas would be marked as environmentally sensitive and nests would be monitored by a Forest Service approved biologist for signs of disturbance during construction. If a Forest Service approved biologist determines project construction activities have the potential to disturb the nest site, standard USFS management LOPs would be implemented within ¼ mile of known active nests. CDFW would also be notified of the nesting activity. • Standard USFS management requirements include limited operating periods (LOPs) when disturbance to wildlife is identified as a concern. The following Limited Operation Periods (LOPs) would be implemented within ¼ mile of known active nest sites: American Peregrine Falcon, February 1st – August 31st; California Spotted Owl: March 1st – August 15th, Northern goshawk: February 15th – September 15th, Bald eagle: January 1st – August 1st. Dates may be adjusted if surveys are conducted prior to project implementation by a Forest Service approved biologist verifying that no active nest sites of the identified wildlife species occur within ¼ mile of construction activities.	PNF and DWR	Prior to Construction and During Construction

Migratory birds, including the yellow warbler	• If practicable, shrub layer vegetation would be removed outside of the bird breeding season (i.e., removal would occur between September 1st and November 15th).		
Tree-roosting bats	• Prior to removal of trees and disturbance of the designated upland borrow sites the area would be surveyed by a Forest Service approved biologist for roosting bats. If bats are detected, steps would be taken to minimize disturbance effects and protect identified roosting sites such as establishing appropriate buffers around the roost site(s) to avoid abandonment of the roost(s). Size of buffers shall depend on the species, roost location, and specific construction activities to be performed in the vicinity. If construction activities are conducted during the maternity season (April 15-August 31) and maternity roosts are identified during surveys, no project activity shall commence within the buffer areas until the end of the pupping season or until a qualified biologist confirms the maternity roost is no longer active. • All removal of trees that provide suitable bat roosting (such as trees with deep bark crevices, snags, or holes) shall be conducted between August 31 and October 30, or earlier than October 30 if evening temperatures fall below 45 degrees Fahrenheit and/or more than a half inch of rainfall occurs within 24 hours. These dates correspond to the time period when bats would not be caring for non-volant young and have not yet entered torpor.	PNF and DWR	Prior to Construction and During Construction
Biological Resources – Plants			

Special-status plant species	• Construction activities would occur during the dry time of the year when stream flow in Thompson Creek is at its lowest, and reproductive cycles for most plant species have reached the seed dispersal stage, from mid-August through mid-November. • There would be no livestock use of treated areas within Thompson Meadow for at least two to three years following construction activities. Only after Forest Service approved resource specialists have determined that livestock use would not destabilize project features would livestock be permitted to graze the meadow within the fenced off riparian and adjacent meadow area. • Appropriate soil fill material for riffles, plugs, grade control structure, and rock apron would be obtained from the closest available source (road modifications, borrow ponds, and meadow borrow site) to minimize travel in the meadow. • To minimize the footprint and soil disturbance of project activities, all heavy equipment would stay within the confines of the work area, and material transport within the meadow would generally not exceed 300 feet. • Should any TES plant species be located during project activities, a Forest Service approved botanist would be informed, and project operations would cease until steps are taken to evaluate and minimize or avoid any possible effects not covered by this assessment.		
Invasive plant species	• To avoid the proliferation of weeds, all equipment would be cleaned to ensure it is free of soil, seeds, vegetative matter, or other	PNF, DWR, construction contractor, and	Prior to Construction, During Construction,

	debris that could contain seeds before mobilization onto the Forest. Equipment would also be washed at the staging area to remove weeds prior to demobilizing from the project area. The project area would be monitored for noxious weed invasion for three years after implementation. Any weeds encountered would be hand-removed. Weed monitoring and removal would be conducted by USFS staff and/or contracted help. Treatment of any noxious weeds found during monitoring would be accomplished by PNF. • Equipment staging areas would be free of invasive species. Known infestations would be identified and avoided during project implementation, or removed before project implementation. West Street from Portola would be avoided as an access route to the project area due to known noxious weed infestations along the roadway. • New or previously unidentified infestations of noxious weeds that are discovered during project implementation would be documented, mapped with a GPS unit, flagged, and avoided. New sites would be reported to a Forest Service approved botanist. • To the extent possible, only on-site vegetative material, soil, and sand would be used as described in the Proposed Action. • Any materials used for restoration or erosion control (i.e. straw, mulch, gravel, and rock material) would be from local sources and weed-free. Rock material collected from the Forest Service Crocker Pit would be verified weed-free by a Forest Service approved botanist prior to rock	construction personnel	and Post Construction

	removal. If it is necessary to use commercially-obtained material, a certificate stating the material was inspected and is weed-free would be required. • Areas of bare ground would be replanted with existing transplanted vegetation (i.e. sedge mats), willow cuttings, and an appropriate mix of native species developed by a Forest Service approved botanist.		
Cultural Resources & Tribal Cultural Resources			
	• A Maidu Tribal Monitor shall be retained to be present during project implementation in proximity to two culturally significant sites that are within and adjacent to the project area. • Standard Forest protection measures including flagging and avoiding the portions of the sites outside of the Area of Direct Impacts (ADI) will be implemented. A qualified Forest Service archaeologist shall be present during project implementation in proximity to two culturally significant sites that are within and adjacent to the project area.	PNF Archaeologist	Prior to Construction and During Construction
	• If unanticipated cultural resource materials are discovered during construction, all earth-moving activity within and around the immediate discovery area would cease until a qualified archaeologist can assess the nature and significance of the find.	PNF, DWR, construction contractor, and qualified archaeologist Federal agency official will notify SHPO, tribes, and ACHP	Prior to Construction and During Construction
	• If human remains are discovered, State Health and Safety Code Section 7050.5 states that further disturbances and activities shall cease in any area or nearby area suspected to overlie remains, and the	PNF, DWR, construction contractor Federal agency official will notify the Plumas	During Construction

	County Coroner contacted. Pursuant to PRC Section 5097.98, if the remains are thought to be Native American, the coroner will notify the Native American Heritage Commission (NAHC) who will then notify the Most Likely Descendent (MLD). Further provisions of PRC5097.98 are to be followed as applicable. The Plumas National Forest operates under a Forest specific Native American Graves and Repatriation Act (NAGRPA) protocol (2017) that will be utilized to immediately inform and engage Indian Tribes in the event of the discovery of Native American human remains or associated items outlined within NAGPRA, i.e. funerary objects, sacred objects and objects of cultural patrimony.	County Coroner, California NAHC, SHPO, tribes, and ACHP	
Geology and Soils & Hydrology and Water Quality			
	• Prior to construction in each treatment area, flowing water would be diverted around the treatment reach to protect water quality and downstream aquatic life.	PNF, DWR, construction contractor	Prior to Construction and During Construction
	• The USFS would obtain a Section 401 Water Quality Certification from the Regional Water Quality Control Board (RWQCB), and a 404 permit from U.S. Army Corps of Engineers (USACE). USFS and DWR would adhere to all conditions and requirements of the regulatory permits.	PNF and DWR	Prior to Construction and During Construction
	• If needed, a RWQCB approved Storm Water Pollution Prevention Plan (SWPPP) would be prepared by a Contractor. The SWPPP would incorporate appropriate temporary construction site BMPs to	PNF, DWR, construction contractor	Prior to Construction and During Construction

	implement effective handling, storage, use, and disposal practices for hazardous materials during construction activities.		
Greenhouse Gas Emissions/Climate Change			
	• **GHG 1.** Evaluate project characteristics, including location, project work flow, site conditions, and equipment performance requirements, to determine whether specifications of the use of equipment with repowered engines, electric drive trains, or other high-efficiency technologies are appropriate and feasible for the project or specific elements of the project. • **GHG 2.** Evaluate the feasibility and efficacy of performing on-site material hauling with trucks equipped with on-road engines. • **GHG 6.** Limit deliveries of materials and equipment to the site to off-peak traffic congestion hours. Construction BMPs apply to all construction and maintenance projects that DWR completes or for which DWR issues contracts. All projects are expected to implement all construction BMPs unless a variance is granted by the Division of Engineering Chief, Division of Operation and Maintenance Chief, or Division of Flood Management Chief (as applicable) and the variance is approved by the DWR CEQA Climate 18 Change Committee. Variances will be granted when specific project conditions or characteristics make implementation of the BMP infeasible and where omitting the BMP will not be detrimental to the project's consistency with the GGERP.	PNF, DWR, construction contractor	Prior to Construction and During Construction

	• **GHG 7.** Minimize idling time by requiring that equipment be shut down after five minutes when not in use (as required by California Code of Regulations, Title 13, Section 2485, the State's airborne toxics control measure). Provide clear signage that posts this requirement for workers at the entrances to the site and provide a plan for the enforcement of this requirement. • **GHG 8.** Maintain all construction equipment in proper working condition and perform all preventative maintenance. Required maintenance includes compliance with all manufacturer's recommendations, proper upkeep and replacement of filters and mufflers, and maintenance of all engine and emissions systems in proper operating condition. Maintenance schedules shall be detailed in an air quality control plan prior to commencement of construction. • **GHG 9.** Implement a tire inflation program on the job site to ensure that equipment tires are correctly inflated. Check tire inflation when equipment arrives on-site and every two weeks for equipment that remains on-site. Check vehicles used for hauling materials off-site weekly for correct tire inflation. Procedures for the tire inflation program shall be documented in an air quality management plan prior to commencement of construction. • **GHG 15.** Evaluate the feasibility of restricting all material hauling on public roadways to off-peak traffic congestion hours. During construction scheduling and execution, minimize, to the extent		

	possible, uses of public roadways that would increase traffic congestion.		
Hazards and Hazardous Materials			
Refer to “Geology and Soils & Hydrology and Water Quality” mitigation measures section.			

Key:

ACHP	Advisory Council on Historic Preservation
ADI	Area of Direct Impacts
BMPs	best management practices
CDFW	California Department of Fish and Wildlife
DWR	California Department of Water Resources
CEQA	California Environmental Quality Act
RWQCB	Central Valley Regional Water Quality Control Board
GHG	greenhouse gas
LOP	Limited Operating Period
MLD	Most Likely Descendent
NAGRPA	Native American Graves and Repatriation Act
NAHC	Native American Heritage Commission
NEPA	National Environmental Policy Act
PNF	Plumas National Forest
PRC	Public Resources Code
SHPO	State Historic Preservation Officer
TES	Threatened, Endangered, and Special-Status species
USACE	United States Army Corps of Engineers
USFWS	United States Fish & Wildlife Service

Appendix B Project Performance Monitoring Plan

THOMPSON MEADOW RESTORATION PROJECT
Project Performance Monitoring Plan

Introduction

The U.S. Forest Service conducts project performance monitoring to verify that the effects analyses were accurate. All the pre-project hydrologic monitoring and baseline survey studies of vegetation and wildlife conducted by DWR, as well as pre-project surveys and monitoring for archaeology, water quality, and wildlife conducted by PNF, were designed to track project performance before and after the Project is implemented. Table 1 lists the project performance measures identified by PNF and DWR for verifying project effects, the responsible party for accomplishing the monitoring, and the time period in which the project performance monitoring will be conducted.

Project Goals

Plumas National Forest (PNF) and DWR have been working collaboratively for several years to develop a restoration and water budget evaluation project in Thompson Meadow. The primary goals of the proposed Project are restoration of historic floodplain function and restoration of the historic meadow water table elevation. Flood flows are currently confined to an incised channel. Restoration of the channel is expected to spread flood flows outside of the channel, thereby reducing flow stresses on the banks and reducing stream bank erosion. The existing incised channel acts as a drain for meadow moisture, so channel restoration is also expected to enhance groundwater retention in the meadow. Restoration of the water table elevation is expected to reestablish meadow vegetation communities by allowing plant roots to reach the water table throughout much of the growing season. Restored meadow vegetation is expected to improve the quality of wildlife habitat and grazing forage. Anticipated improvements to water quality, including reduced water temperatures and decreased sediment supply, are expected to benefit aquatic species.

Project Monitoring Conducted To Date

DWR has been conducting a robust surface water and groundwater monitoring program of the proposed Project area since 2012. The intent of this monitoring was to improve the understanding and quantification of hydrologic benefits of meadow restoration in the Sierra Nevada. DWR installed monitoring equipment to thoroughly evaluate changes in stream flow entering and leaving the meadow before and after restoration. This monitoring network includes stream flow gages, groundwater measurement wells, soil moisture sensors, a weather station, and two evapotranspiration measurement stations. DWR is funding and operating the hydrologic monitoring network and has conducted pre-project wildlife and vegetation surveys. PNF has provided environmental monitoring support with supplemental monitoring of wildlife, surface water temperature and dissolved oxygen, and vegetation surveys.

Post-project Monitoring (Table 1)

Post-project hydrologic monitoring is planned to continue for 5 years following project implementation, with DWR then modeling the project effects. No additional installation of monitoring equipment is proposed. Project monitoring would also include pre- and post-implementation surveys of avian, terrestrial, and aquatic wildlife, as well as vegetation mapping.

Table 1. Project Performance Monitoring Plan for Thompson Meadow Restoration and Water Budget Evaluation Project

Performance Parameter	Description of Performance Parameters	Monitoring Responsibility	Timing
Stream Flow	To effectively evaluate the movement of surface and subsurface flow into and out of the project area, sheet piles were driven at the upper and lower end of the project area along Thompson Creek. This forces subsurface flow to the surface where it joins stream flow. The combined flow passes over the resulting sheet pile structure. The structure incorporates a weir and a flume for high-precision flow measurement. The unnamed tributary to Thompson Creek also employs sheet piles, but uses a weir as a flow measurement device. All flow measurement stations record data continuously. Flow data are available from the California Data Exchange Center's (CDEC) website. The group ID is TVL http://cdec.water.ca.gov/	DWR	Ongoing; 5 consecutive yrs after construction
Weather Station	Parameters being continuously recorded include precipitation, air temperature, relative humidity, barometric pressure, wind speed, wind direction, and solar radiation. Weather station data are available from the CDEC website. The site ID is TVL http://cdec.water.ca.gov/	DWR	"
Groundwater Elevation	Ten wells were constructed throughout the project area. Continuous water level and temperature measurements are recoded at each well. Soil profile and depth to bedrock were recorded during the drilling of the wells.	DWR	"
Soil Moisture	Sensors are co-located with the weather station and groundwater well number five. Soil tension is used to calculate moisture and is recorded at depths of 12, 24, 36, and 48 inches at both stations. Both stations record soil temperature at 12 inches. Measurements are recorded every two hours.	DWR	"

Topographic Surveys	Topographic surveys of the creek were conducted in 2006 and again in 2013. The 2013 survey included the entire project site.	DWR	Surveys will be repeated following project construction in years 1 and 5.
Evapotranspiration	A large uncertainty in water budget evaluations is evapotranspiration. DWR has installed a modified surface renewal station to measure parameters needed to calculate evapotranspiration in the meadow. In areas outside of the meadow, vegetative water use will be estimated through the use of Surface Energy Balance Algorithm for Land (SEBAL) maps of evapotranspiration and other vegetative water use studies.	DWR	“
Water Temperature	Continuous surface water temperature data are being recorded at the upstream and downstream end of the project. PNF dissolved oxygen sensors also record water temperature (refer to “Dissolved Oxygen” section)	DWR and PNF	“
Dissolved Oxygen (DO)	DO sensors were deployed in three locations in Thompson Creek during one season in August-October.	PNF	DO will be measured year 3 in Aug-Oct following construction.
Wildlife	Pre-project wildlife, avian, small mammal, fishery, and reptile surveys have been completed. Bat surveys were completed by PNF and PNF game cameras were deployed around the project area.	DWR and PNF	Post-project surveys will be conducted by DWR during years one, three, and five after construction. PNF will repeat bat surveys in after construction and will maintain deployed game cameras for up to five years after construction.
Vegetation	Pre-project vegetation mapping and biomass assessments have been completed by DWR. Annual grazing	DWR and PNF	Post-assessments will be conducted

	allotment utilization is conducted by PNF.		annually by DWR for up to 5 years after construction. PNF will monitor grazing utilization annually.
All these data will continue to be collected, compiled, and analyzed through pre- and post-meadow restoration performance monitoring. The effort will gather five years of pre-project and five years of post-project data. The water budget evaluation will be a detailed hydrologic analysis incorporating the monitoring effort. The resulting evaluation will be made available to all stakeholders and the public.			

Appendix C Past, Present, and Reasonably Foreseeable Activities

Past, Present, and Reasonably Foreseeable Future Activities in and near the proposed Thompson Meadow Restoration Project

Past Activities

- Red Clover McReynolds Creek Restoration
- Red Clover Poco Restoration
- Upper Dotta Canyon Restoration
- Clover Valley Ranch Wetland Reserve Program Restoration
- Timber Harvest
- Livestock Grazing
- Recreational Uses (dispersed camping, hunting, fishing, OHV use, mountain biking)

Present Activities

- Clover Valley Ranch Wetland Reserve Program Restoration
- Livestock Grazing
- Recreational Uses (dispersed camping, hunting, fishing, OHV use, mountain biking)

Future Activities

- Mapes Fuels Reduction/Timber Harvest Project
- Livestock Grazing
- Recreational Uses (dispersed camping, hunting, fishing, OHV use, mountain biking)

Appendix D Inventory and Calculations of Greenhouse Gas Emissions

Thompson Meadow - Inventory and Calculation of Greenhouse Gas Emissions

Line	Emissions from Construction Equipment							
1	**Type of Equipment**	**Maximum Number per Day**	**Total Operation Days**	**Total Operation Hours[1]**	**Fuel Consumption Per Hour[2]**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal diesel[3]**	**Total CO_2 Equivalent Emissions (metric tons)**
2	*refer to Equip Fuel Consumption Tab for equipment types and factors*			0		-	0.010	-
3	330 Excavator	2	45	720	7.19	5,177	0.010	53.79
4	966 Loader	3	45	1080	6.76	7,301	0.010	75.87
5	Grader	1	5	40	5.66	226	0.010	2.35
6	Dozer	1	45	360	7.55	2,718	0.010	28.24
7	4000/ga On-highway Water Truck	1	45	360	4.32	1,555	0.010	16.16
8	Rollers (sheep's-foot roller compactor)	1	45	360	2.71	976	0.010	10.14
9	Portable water pump	1	45	360	2.71	976	0.010	10.14
10	Other Construction Equipment (chain saw)	1	4	32	0.6	19	0.010	0.20
11				0		-	0.010	-

24				0		-	0.010	-
25	TOTAL					**18,948**		**196.89**
26	[1] An 8-hour work day is assumed.							
27	[2] California Air Resource Board Offroad 2007 Emissions Inventory fuel consumption factors							
28	[3] World Resources Institute-Mobile combustion CO_2 emissions tool, June 2003 Version 1.2							
29								
30	**Emissions from Transportation of Construction Workforce**							
31	**Average Number of Workers per Day**	**Total Number of Workdays**	**Average Distance Travelled (round trip)**	**Total Miles Travelled**	**Average Passenger Vehicle Fuel Efficiency[4]**	**Total Fuel Consumption (gal. gasoline)**	**CO_2e/gal Gasoline [3]**	**Total CO_2 Equivalent Emissions (metric tons)**
32	12	45	100	54000	20.8	**2596.2**	0.009	**23.39**
33	[4] United States Environmental Protection Agency. 2008. Light-Duty Automotive Technology and Fuel Economy Trends: 1975 through 2008. [EPA420-R-08-015]							
34								
35	**Emissions from Transportation of Construction Materials**							
36	**Trip Type**	**Total Number of Trips**	**Average Trip Distance**	**Total Miles Travelled**	**Average Semi-truck Fuel Efficiency**	**Total Fuel Consumption (gal. diesel)**	**CO_2e/gal Diesel [3]**	**Total CO_2 Equivalent Emissions (metric tons)**
37	Delivery (rock)	758	25	18950	6	3158.333333	0.010	32.8194292
38	Delivery (soil)	820	1	820	6	136.6666667	0.010	1.42015472
39	TOTAL							**34.2395839**
40								
41	**Construction Electricity Emissions**							

42			**MWh of electricity**	**mtCO2$_e$ / MWh[5]**	**CO_2 e emissions**			
43	Electricity Needed		0	0.277	0			
44	[5] eGRID2010 Version 1.0 *CAMX-WECC sub-region*.							
45								
46	**Total Construction Activity Emissions**				254.5	(from lines 25, 32, 39, and 43)		
47	**Total Years of Construction**				1			
48	**Expected Start Date of Construction**				August-20			
49								
50	**Estimated Project Useful life**			50	Years			
51	**Average Annual Total GHG Emissions[7]**			5.09045 1	**MT CO_2 equivalents**			
52	**Max. Year Construction GHG Emissions[8]**				**MT CO2 equivalents**			
53	[7]short-term construction emissions amortized over life of project							
54	[8]Emissions total from single year of construction when emissions peak (for multi-year construction projects)							
	NOTE: the Average Annual Total GHG Emissions is NOT the same value as the "Maximum Annual Emissions" (MAE) value that is required on the DWR GGERP Consistency Form form for Projects Using Outside Labor and Equipment; The MAE is calculated to ensure that the project does not emit more than 12,500 mtCO2e in any given year							

Greenhouse Gas(GHG) Emissions Reduction Plan Consistency Determination

For Projects Using Contractors or Other Outside Labor

This form is to be used by DWR project managers to document a DWR CEQA project's consistency with the DWR Greenhouse Gas Emissions Reduction Plan. This form is to be used only when DWR is the Lead Agency and when contractors or outside labor and equipment are used to implement the project.

Additional Guidance on filling out this form can be found at:
http://dwrclimatechange.water.ca.gov/guidance_resources.cfm

The DWR Greenhouse Gas Emissions Reduction Plan can be accessed at:
https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan

Project Name:	Thompson Meadow Restoration and Water Budget Evaluation
Environmental Document Type:	EA/IS
Manager's Name:	Todd Hillaire
Manager's E-mail:	Todd.Hillaire@water.ca.gov
Division:	Division of Regional Assistance
Office, Branch, or Field Division:	Norther Region Office

Short Project Description:

The US Forest Service in partnership with DWR proposes to restore floodplain function and water table elevation within the degraded 47-acre Thompson Meadow along a 0.68 mile reach of Thompson Creek utilizing a variety of restoration techniques along the channel: pond and plug, complete channel fill, rock sleeper weirs, rock raised riffle structures, rock grade control structure, and rock apron.

Project GHG Emissions Summary:

Total Construction Emissions	254.5	$mtCO_2e$
Maximum Annual Construction Emissions	254.5	$mtCO_2e$

☒ All other emissions from the project not accounted for above will occur as ongoing operational, maintenance, or business activity emissions and therefore have already been accounted for and analyzed in the GGERP.

Extraordinary Construction Project Determination:

Do total project construction emissions exceed 25,000 $mtCO_2e$ for the entire construction phase or exceed 12,500 $mtCO_2e$ in any single year of construction?

☒ No- Additional analysis not required

☐ Yes - Project specific emissions mitigation measures have been included in the environmental analysis document for the project

Project GHG Reduction Plan Checklist:
☒ All Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project. (Project Level GHG Emissions Reduction Measures) Or ☐ All feasible Project Level GHG Emissions Reduction Measures have been incorporated into the design or implementation plan for the project and Measures not incorporated have been listed and determined not to apply to the proposed project (include as an attachment)
☒ Project does not conflict with any of the Specific Action GHG Emissions Reduction Measures (Specific Action GHG Emissions Reduction Measures)
Would implementation of the project result in additional energy demands on the SWP system of 15 GWh/yr or greater? ☐ Yes ☒ No If you answered Yes, attach a letter documenting that the project has consulted with the DWR SWP Power and Risk Office regarding the additional power requirements of the project.
Is there substantial evidence that the effects of the proposed project may be cumulatively considerable notwithstanding the proposed project's compliance with the requirements of the DWR GHG Reduction Plan? ☐ Yes ☒ No If you answered Yes, the project is not eligible for streamlined analysis of GHG emissions using the DWR GHG Emissions Reduction Plan. (See CEQA Guidelines, section 15183.5, subdivision (b)(2).)

Based on the information provided above and information provided in associated environmental documentation completed pursuant to the above referenced project, the DWR CEQA Climate Change Committee has determined that:

☐ The entire proposed project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gases emitted by the project are covered by the plan's analysis.

☐ The operational and maintenance phase of the project is consistent with the DWR Greenhouse Gas Reduction Plan and the greenhouse gases emitted by the project are covered by the plan's analysis. Emissions from the construction phase of the project are not covered by the DWR Greenhouse Gas Emissions Reduction Plan and will be mitigated as part of the project.

Project Manager Signature: _____ Date: _____

C4 Approval Signature: _____ Date: _____

Attachments:

☒ GHG Emissions Inventory ☐ List and Explanation of excluded Project level GHG Emissions Reduction Measures ☐ SWP Power and Risk Office Consultation Letter

Links:
https://current.water.ca.gov/programs/icc/SitePages/Home.aspx
https://water.ca.gov/Programs/All-Programs/Climate-Change-Program